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The COBRAS Synthetic Theater of War Exercise Trial: Report on Development, Results, and Lessons Learned

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14. ABSTRACT *(Maximum 200 words)*:

This report details the design and development process for the Synthetic Theater of War (STOW) exercise produced in the COBRAS III project. The exercise was to serve as the vehicle for three primary research areas: training support package and resource requirements, technology and infrastructure requirements, and potential for training value. The multiechelon training audience of the Brigade Combat Team included the brigade commander and staff, the commander and staff of one battalion task force (TF), and the line company commanders, first sergeants, fire support team leaders, and scout platoon of that TF. The STOW environment linked constructive simulation (the Brigade/Battalion Battle Simulation [BBS] and Modular Semi-Automated Forces [ModSAF]) and virtual simulation (Simulation Networking [SIMNET]) and reconfigurable simulators). The trial implementation in February - March 1998 involved members of TF 1-101, 3rd Brigade, and 42nd Infantry Division of the New York National Guard, along with supporting participants from the Force XXI Training Program, contracted logistics support (CLS) staffs, and the COBRAS Team. Training support was found to be manageable but resource-intensive. Technology and infrastructure findings were mixed: the systems promise exciting training opportunities, but there were many suggestions for improvement from participants. From the unit members' point of view, the exercise provided valuable training, and there was strong support for continued STOW and reconfigurable simulator development and use.

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FOREWORD

Despite significant budgetary constraints, the United States (U.S.) Army faces the challenges of maintaining combat readiness and preparing for the battlefield of the 21st century. In fiscal year 1994, Congress appropriated funding for the Virtual Brigade Training Program (Department of Defense, October 1993). Shortly thereafter, program development was assumed by the Force XXI Training Program that is addressing the training of the modern force, and the program was renamed Combined Arms Operations at the Brigade Level, Realistically Achieved Through Simulation (COBRAS).

Several projects have been initiated under the COBRAS umbrella, all funded through the Defense Advanced Research Projects Agency, and developed by the U.S. Army Research Institute for the Behavioral and Social Sciences and the U.S. Army Armor Center (Memorandum of Agreement entitled "Force XXI Training Program [i.e., Virtual Brigade Training Program]," June 1994). The first project, COBRAS I, developed two types of exercises designed for the staffs of inexperienced, conventionally-equipped brigades: vignettes for segments of the staff and a larger Brigade Staff Exercise (BSE) focusing on the primary staff members plus the staff responsible for combat support (CS) and combat service support (CSS). Both exercise types offer practice and feedback opportunity in combat fundamentals. The second project (COBRAS II) expanded on the COBRAS I training research and development, implementing lessons learned and satisfying training needs (i.e., training for staff personnel linking the brigade staff and additional CS and CSS systems) exposed during that and related, concurrent efforts. With the completion of the COBRAS II effort, the BSE and 24 vignettes were ready for export and implementation.

The third COBRAS project (the subject of this report) took the overall COBRAS program to the next level of complexity in two ways: 1) Design, develop, and evaluate a multiechelon exercise for brigade and battalion staffs, with intensified implementation conditions and integrated performance objectives (Campbell et al., in preparation); and 2) Design and develop a multiechelon Synthetic Theater of War (STOW) exercise and implement the exercise in order to assess specific aspects of the technology, training value, and resource demand. This report discusses the background of the COBRAS STOW exercise and documents the design and development of the resulting training program. Also contained are lessons learned for future development efforts and training issues that will likely demand attention in the near future.

Force XXI policy makers and training developers, as well as simulation designers, should find this report useful in the course of continuing steady progress toward Force XXI goals in simulation development, training, and readiness.

ZITA M. SIMUTIS
Technical Director

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This report reflects the efforts of a team of research scientists, military experts, performance analysts, training developers, simulation systems experts, and administrative support personnel. During the course of the 18-month effort to develop the training, some 50 Army Research Institute for the Behavioral and Social Sciences (ARI) and contractor personnel were involved in design, development, implementation, and evaluation. All contractor personnel were staff from four organizations that form the Combined Arms Operations at Brigade Level, Realistically Achieved Through Simulation (COBRAS) Consortium: the Human Resources Research Organization, Raytheon (formerly Hughes Training, Inc.), TRW S&ITG (formerly BDM Federal, Inc.), and Litton PRC.

Additionally, we had support and guidance from a variety of individuals and government organizations, including:

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  Brigadier General Robert Wilson, Deputy Commanding General USAARMC
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  COL Peter W. Chiarelli, Commander
- Lieutenant General (Retired) Frederic J. Brown, Ph.D.

THE COBRAS SYNTHETIC THEATER OF WAR EXERCISE TRIAL: REPORT ON DEVELOPMENT, RESULTS, AND LESSONS LEARNED

EXECUTIVE SUMMARY

Research Requirement:

In 1994, the Army Research Institute for the Behavioral and Social Sciences (ARI), in coordination with the Force XXI Training Program and the U.S. Army Armor Center (USAARMC), launched a research and development effort designed to help brigade staffs become proficient in the combat fundamentals that will be required on the digital battlefield. This effort, titled *Combined Arms Operations at Brigade Level Realistically Achieved through Simulation (COBRAS)*, is developing and evaluating structured, simulation-based training programs and strategies to address the training need.

The predecessor projects (COBRAS I and COBRAS II) developed both a Brigade Staff Exercise (BSE) (Graves, Campbell, Deter, & Quinkert, 1997) and an expanded battalion exercise for use in the Virtual Training Program (VTP) (Hoffman, 1997). The recently completed COBRAS III project was to use elements of both of those efforts in developing more complex training for brigade and battalion staffs in multiechelon exercises. The objective of the first part of the COBRAS III project was to develop and evaluate a Brigade and Battalion Staff Exercise (BBSE) that provides structured training for a multiechelon audience and presents intensified scenario conditions. The evaluation was to provide lessons learned and insights into the advancement of the Force XXI training strategy. The BBSE development and results are reported in an ARI Research Report (Campbell et al., in preparation).

The objective of the second portion of the COBRAS III work, the subject of this report, was to develop and evaluate a Synthetic Theater of War (STOW) exercise for a multiechelon training audience. The evaluation addressed three specific research areas: training support packages (TSPs) and resource requirements, technology and infrastructure requirements, and training value.

Procedure:

Working from the COBRAS II BSE, the COBRAS expanded battalion exercise for the VTP, and the COBRAS III BBSE products, developers first identified the multiechelon training audience positions for the STOW exercise. These included the brigade commander and staff and the commander and staff of one battalion task force (TF), and the line company commanders, first sergeants, fire support team leaders, and scout platoon of that TF.

The STOW environment included both constructive simulation (the Brigade/Battalion Battle Simulation [BBS] and Modular Semi-Automated Forces [ModSAF]) and virtual simulation (Simulation Networking [SIMNET] and reconfigurable simulators). COBRAS developers worked closely with STOW developers to identify weak links in the technology, recommend additional features and capabilities, and devise stopgap workaround solutions to technical difficulties for the trial.

The BBSE scenario was refined both to provide performance opportunities for the full brigade and battalion audience, and to conform to the capabilities of the STOW technology. The exercise architecture was also revised to make it suitable for the STOW environment. This foundation was then used to construct the TSP materials for the planning, preparation, and execution of one mission, a deliberate attack.

Because of the experimental nature of the exercise, many of the support positions that would normally be filled by unit members were instead staffed by developers from the Fort Knox USAARMC community. Members of the Force XXI Training Program, the COBRAS team, and contracted logistics support staff members for BBS and SIMNET participated as evaluation observers and simulation controllers. Because of their familiarity with their roles and responsibilities, a full TSP was neither needed nor constructed for the trial. All of the components that the unit members and observers needed were provided, along with all of the appropriate job aids.

Performance objectives for the training audience were drawn from the BBSE for the brigade and battalion TF commanders and staff members, and from the COBRAS battalion expansion to the VTP for the line company and scout platoon members. The implementation model called for the Warthog Observer/Controller (O/C) Team and the Senior O/C Team (16th Cavalry Regiment, Fort Knox) to serve as observers during the exercise.

The participating unit was the 3rd Brigade, 42nd Infantry Division of the New York National Guard, along with one TF (TF 1-101). The TF deployed to Fort Knox for a week of training in the VTP as part of its annual training, and the 3rd Bde Commander and staff arrived for the STOW exercise the following week.

Findings:

Findings from the trial implementation address training support, technology and infrastructure requirements, and training value. The TSP design and development approach was considered a success. Both personnel and time requirements are heavy but manageable.

The technology and infrastructure were, at the time of the trial, still developmental. As a result, there were many suggestions for improvements and corrections. Still, the overall impression was that the STOW exercise showed the potential for training opportunities not yet offered in simulation.

The trial implementation of the STOW exercise resulted in strong expressions of support from the participating unit for continued STOW and reconfigurable development and use. They also provided a great many points of consideration for improvement.

Products include this report and a special ARI report entitled *COBRAS Synthetic Theater of War Exercise Trial: Summary and Report of Findings* (Campbell, Campbell, Ford, Pratt & Deter, in preparation) in addition to the TSP materials themselves.

The history and recommendations are presented to assist training developers, including Force XXI policymakers, as they continue to advance and promote the Force XXI Training Program and STOW-type exercises in particular.

Utilization of Findings:

This report presents the history of the development of the COBRAS STOW Exercise and the lessons learned during the exercise development and implementation. As continued emphasis is placed on providing low-resource, cost-effective training for increasingly complex segments of the brigade combat team, this report can lead other training developers into the selection of effective design and implementation strategies.

THE COBRAS SYNTHETIC THEATER OF WAR EXERCISE TRIAL: REPORT ON DEVELOPMENT, RESULTS, AND LESSONS LEARNED

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THE COBRAS STOW EXERCISE TRIAL: REPORT ON DEVELOPMENT, RESULTS, AND LESSONS LEARNED

Introduction

Since the mid-80s, virtual and constructive simulations have been used in a bewildering variety of configurations to support training. The earliest uses were experimental, offering opportunities for researchers to explore capabilities and training utility. These were followed by development of more formal structured training programs that incorporated the simulation features. Additional efforts explored methods for expanding the use of the simulations capabilities or designing more sophisticated training systems that would exploit the latest in emerging technologies. Continual development and revision were also necessary to keep pace with changes in combined arms operations, including changes to weapons and communications systems, organizations, and tactical, strategic, and logistical doctrine.

In early 1997, the Force XXI Training Program (FXXITP) and the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) Armored Forces Research Unit embarked on design and development to support a multi-simulation exercise trial. It would link constructive simulation (the Brigade/Battalion Battle Simulation [BBS] and Modular Semi-Automated Forces [ModSAF]) with virtual simulation (Simulation Networking [SIMNET] and two types of reconfigurable simulators) to provide a training environment for the integrated activities of the members of a brigade combat team (BCT). This type of linked simulation is often referred to as a Synthetic Theater of War (STOW). The STOW Exercise Trial (STOW-ET) was to be a proof-of-principle implementation of a structured multiechelon training exercise. It brought together the most current STOW technology, a prototype training support package (TSP), personnel of a National Guard brigade, and researchers from the Fort Knox, Kentucky training development community.

The planned STOW-ET was part of a series of developmental activities examining linked simulation technologies. This exercise would serve as a trial on several levels, with focuses in three research areas: technology and operational requirements, the training support requirements, and the training value. Results of the trial were to provide information about the trial itself, and also form the basis for recommendations for future STOW exercise development and implementation, especially at Fort Knox.

This was an ambitious undertaking. There were many participants who had to synchronize and orchestrate their interests and activities in order to get the exercise trial launched. They included:

- Directorate of Training and Doctrine Development (DTDD), Force XXI Training Program (FXXITP), U.S. Army & Armor Center, Fort Knox – responsible for STOW architecture and infrastructure issues; liaison with National Simulation Center (NSC) and the Simulation, Training, and Instrumentation Command.
- 16th Cavalry Regiment, Fort Knox – provided Virtual Training Program, (VTP) support for the participating unit, as well as observer/controllers (O/Cs) from the Warthog Team and the Senior Observer/Controller Team (SOCT) and simulation site staff from the contractor logistics support (CLS) teams.

- U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) and its contractors, the COBRAS Team – provided the exercise concept and plan, the TSP for the exercise, exercise control, and exercise evaluation.
- 42nd Infantry Division-Mechanized (ID [M]), 3rd Brigade (Bde), and Task Force (TF) 1-101 – volunteered to participate as the training unit as a part of the annual training for TF 1-101 and as part of their preparation for a Warfighter exercise in May 1998.

Purpose of the STOW Exercise Trial

The three areas of interest for the STOW-ET were developed jointly by the DTDD FXXITP and ARI. They were restated as research questions by ARI and FXXITP:

- What are the unique challenges and considerations associated with training support for a structured STOW-based exercise?
- What simulation and infrastructure capabilities are needed to make STOW-based training possible?
- What is the value added by training in a STOW-based environment?

The primary data collection efforts for addressing the research questions included direct observation and documentation by the COBRAS staff, structured individual and group interviews conducted with selected members of the trial unit and supporting participants, and questionnaires distributed to all participating members of the trial unit and the observers.

Organization of the Report

This report presents the history and outcomes of the STOW exercise trial conducted at Fort Knox in March 1998. The six sections of the report include:

- Concepts Overview – descriptions of structured training, TSPs, and simulation
- Training Program Foundations – summary of related training development efforts in the areas of structured simulation-based training and STOW-type exercises
- History – a short description of the major decisions in the planning and preparation for the exercise trial
- Method – describes the STOW exercise trial plan, including the participating unit, the technology, the TSP used, the support personnel who assisted during the trial, and the evaluation plan
- Results – summary of the evaluation questions for the trial; the collected data, interviews, and observations from the trial; discussion of the findings; and the implications of those findings. The three subsections focus on training design and TSP issues, operational issues, and training value
- Implications for Future Research and Development – addressing each of the three research areas.

Appendix A contains definitions of the acronyms and abbreviations used in this report.

Concepts Overview

This section presents background information on structured training, TSPs, and simulations.

Structured Training

Structured training refers to that training which is deliberately designed to focus on selected tasks and activities. Implementation of the training is carefully controlled so that those tasks will be cued and can be performed and observed. Performance is then reinforced or corrected by means of targeted feedback sessions, usually referred to as after action reviews (AARs).

The performance cues for the selected tasks are provided by events in the exercise scenario. The scenario includes starting readiness levels and dispositions for the participating unit, the planned activities for the opposing forces (OPFOR), and the planned directions and messages from the higher and adjacent units. Observers maintain their focus on the selected tasks with the aid of observation packages that describe the cues, indicators of the desired performance, and methods for helping participants "discover" an optimal approach or means of accomplishing the task. These materials are incorporated in a TSP for the exercise, as described below.

Training Support Packages

The design and development process for TSPs is well documented. The Training and Doctrine Command (TRADOC) Regulation 350-70 (Department of Army [DA], 1995) provides the basic requirements. A series of method reports produced by ARI documents development processes (Campbell, Campbell, Sanders, Flynn, & Myers, 1995; Campbell & Deter, 1997; Campbell, Ford, & Campbell, 1998; Graves & Myers, 1997). The basic components and structure of a TSP, as defined in TRADOC Regulation 350-70, are shown in Figure 1. The components are:

- *Tactical materials.* Such materials may include operations orders (OPORDs) and other mission-specific materials to be used in unit preparation and rehearsals, prepared messages and scripted materials that are used during the exercise to cue tasks, and descriptions of personnel and equipment status to set the scenario conditions.
- *Preparation materials for the training participants.* These assist unit leaders in selecting the appropriate training for their needs, provide guidance on unit preparation, and describe the time, personnel, and facility requirements.
- *Guidance for other participants.* These guides are the "train the trainer" materials. They direct observer attention to specific task performance, describe acceptable performance, and outline the feedback sessions. For simulation-based vignettes, there will also be instructions for operation of the simulation and guidance for role-players who interact with the unit during the exercise.

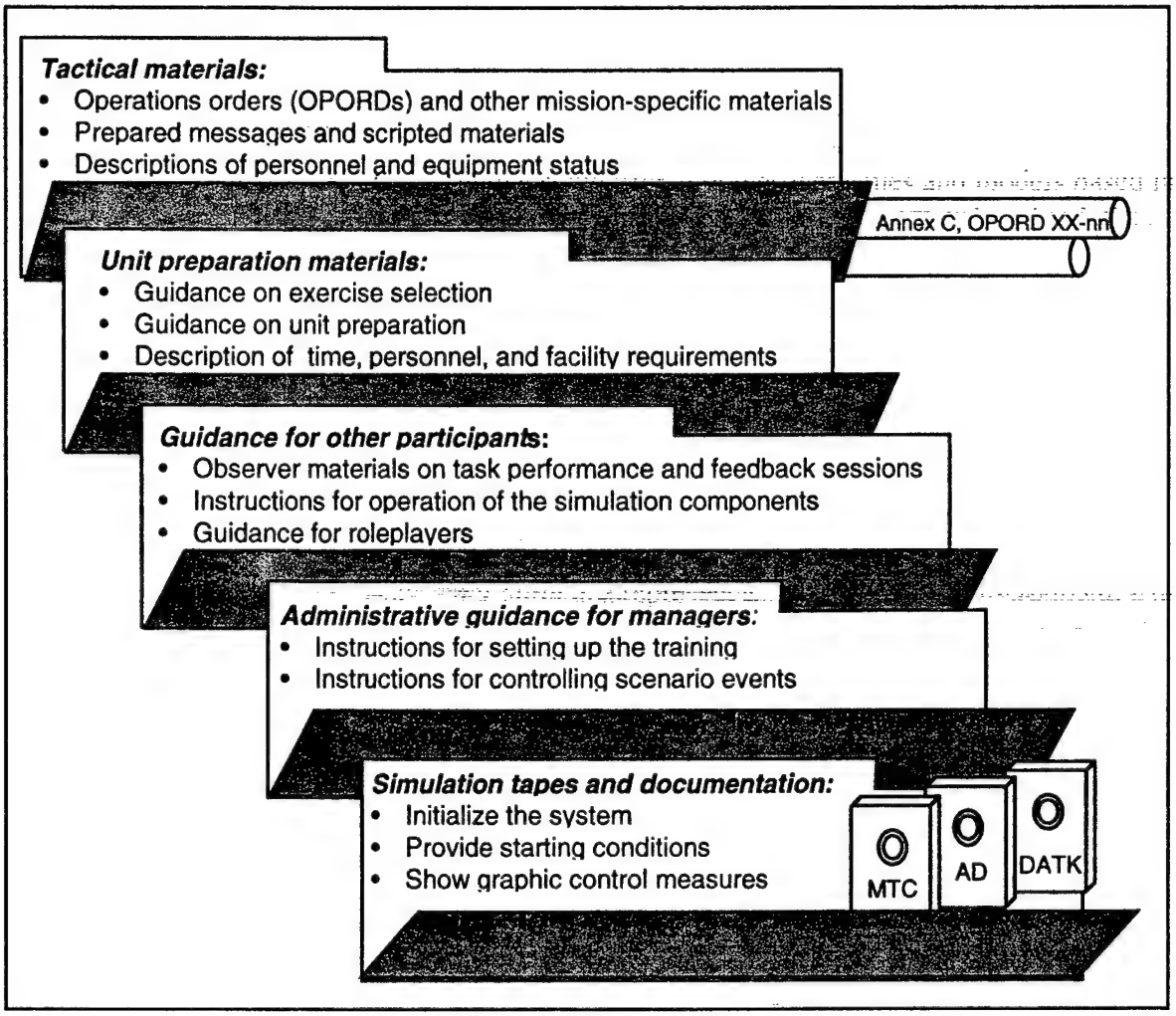

Figure 1. Example of the training support package components for a BBS-based structured training exercise.

- *Administrative guidance for managers of the training.* These include instructions and suggestions for setting up the training and controlling scenario events for the individuals designated to implement the exercise (Exercise Director and his/her assistants).
- *Simulation files and documentation.* Simulation files, on disk or tape, are used with the constructive or virtual simulation to initialize the system, input starting conditions (e.g., locations, task organization), and show graphic control measures. The documentation is provided as back-up in case the initialization tapes are not usable.

This structure for the components of a TSP allows developers considerable latitude in organizing and presenting their materials. Such flexibility is essential, because every structured training program requires an individually prepared TSP, specific to the requirements of that program.

Simulations

Simulations and simulators used in training fall into three types: *constructive, virtual,* and *live:*

- *Constructive simulation* involves wargames and models based largely on algorithmic and mathematical methods. Typically, constructive simulations aggregate units, their behaviors, and outcomes. In training, constructive simulation is most often used as an exercise driver. Examples of constructive simulations are Janus, Spectrum, BBS, the corps battle simulation, and ModSAF.
- *Virtual simulation* involves manned simulators, usually replicating actual weapons platforms, interacting with a synthetic environment. Virtual simulators are generally single entities, under the control of their actual operators or crews. Examples of virtual simulations are the SIMNET, air network (AIRNET), and the combined arms tactical trainer family of simulators under development.
- *Live simulation* is a representation of the actual environment using military personnel and equipment. Exercises such as those conducted at the combat training centers (CTCs) are typically considered as the most robust live simulations.

The Army's current STOW development products are contained within the STOW Architecture (STOW-A). STOW-A consists of five elements:

- *BBS.* BBS is the constructive simulation of choice for the STOW-A. BBS carries out combat, combat support (CS), and combat service support (CSS) functions and provides realistic and accurate reports for detailed planning and decision-making for commanders and staffs.
- *SIMNET.* SIMNET provides the virtual simulation for STOW-A with soldiers operating individual tank and infantry fighting vehicle (IFV) simulators.
- *ModSAF.* The computer-generated forces of ModSAF are used in two applications in STOW-A. They are used to replicate the BBS generated units in the virtual (SIMNET) environment. They are also used to round out the manned simulators to create full platoons, company teams, or TFs, and to provide the elements of the virtually portrayed units which cannot be represented by tank or IFV simulators.
- *Stealth and Datalogger.* These are part of the virtual SIMNET capabilities. The Stealth allows two-dimensional and three-dimensional, non-intrusive "see-all" capability either tethered to a virtual entity or detached and used in a "fly-through" mode. Datalogger provides capture of how the forces operated for both after-action and system evaluation.
- *Infrastructure.* Various infrastructure components provide for the linkages between simulators and for integration of remote sites. They accomplish translation of data between BBS and ModSAF and provide for the aggregation and disaggregation process (described below). Infrastructure components also translate battlefield effects, such as fires and destroyed vehicles, between simulations. Other infrastructure provides for the two-way distributed interactive simulation (DIS) interface between simulations and between locations.

One major technical concept that must be understood to fully appreciate the difficulties in effecting a STOW linkage concerns how elements are displayed and controlled in the simulation. In virtual simulation, each element (tank, fighting vehicle, aircraft, truck), whether friendly or enemy, manned or automated, is portrayed as a single, discrete entity that usually looks much like the item it represents (e.g., a tank, a dismounted soldier). In constructive simulation, however, the entities are *aggregated.* Aggregation is a collection of vehicles or systems portrayed in the simulation display by a single icon or unit symbol. Depending on the simulation, aggregation can be done at a variety of organizational levels (e.g., section, platoon, company team, battalion TF) and can contain any mix of equipment and individuals.

However, when simulations are linked, each simulation operator must "see" all forces in the manner that is specific to his simulation. For example, the SIMNET crewmember must see three individual T-72 tanks, not the OPFOR tank platoon icon that the BBS operator has portrayed on his screen. For this, the constructive portrayal (the tank platoon icon) must be *disaggregated* to the three T-72 tanks. Likewise, the BBS operators cannot use 14 individual SIMNET tank icons; they need a single company size icon. This constant aggregation and disaggregation is accomplished through the STOW DIS function but requires significant operator interaction.

Training Program Foundations

The STOW-ET was not the first structured simulation-based exercise developed and implemented by ARI, nor was it the first STOW exercise trial performed by the U.S. Army. However, the STOW-ET was unique in bringing together the accumulated knowledge and experience in both structured training and STOW technology to support the research. This section describes related projects in both areas.

Structured Simulation-Based Training Program Development and Implementation

ARI and the Fort Knox training community have been active pioneers in the definition and implementation of structured simulation-based training for many years. Recently, there has been a wave of innovative development efforts. It began on a major scale in 1993 with work aimed at alleviating the significant training problems faced by the U.S. Army National Guard (ARNG). ARNG unit training time is typically restricted to 39 days annually. In addition, the expense associated with the use of actual equipment (e.g., fuel, ammunition) makes field training a luxury. In fact, many units do not have access to the facilities required for conducting tactical training in the field.

In response to this problem, the U.S. Congress provided for the creation of the VTP at the Mounted Warfare Simulation Training Center (MWSTC) in Fort Knox, Kentucky. In order to address ARNG needs, this program was intended to:

- Compress training by providing a "turn-key" training management component;
- Distribute training by providing advance materials for home station preparation, detailed after-training summary reports, and the option of implementation at mobile training facilities;

- Modernize training by the leveraged use of virtual and constructive simulations and multimedia training programs, and;
- Focus on critical tasks beginning with the initial design phase, and incorporating that focus in observation tools, exercise control guidance, and AARs.

ARI and a consortium of contractors, including HumRRO, TRW S&ITG, and Litton PRC, designed and developed the required program. The objectives were achieved by means of several key design features:

- The training is simulation-based. By using virtual and constructive simulation technologies, the unit can perform in a realistic tactical environment with simulated terrain, enemy, weapons effects, and movement.
- The training is structured. Careful attention to critical tasks during the design phase meant that all of the program components were focused on training those tasks.

Between 1993 and 1996, the library of VTP exercises grew to cover a wide array of command levels and unit types. All of the exercises derive from a common set of higher-echelon missions, using the same task organization, terrain, and enemy situation. The focus is on execution of the mission and employment of the unit's maneuver forces. Currently, the TSP is in continual use throughout the year, supported by the Warthog O/C team at Fort Knox.

Soon, the word got out to active component (AC) units that a structured simulation-based approach to training could give them the power to train more with less. Along with ARNG units, AC units began to incorporate the program into their training strategies. They also began to point out additional training needs that might be addressed through structured simulation-based training.

One such need was for brigade staff training that would allow them to practice all aspects of selected operations, including planning and preparation as well as execution and follow-on activities. The training needed to be flexible, so that differently organized brigades could use the program under different conditions of implementation. It needed to incorporate not only combat functions, but also CS and CSS, so that integrated training could occur. It needed to be based on an as-yet nonexistent task analysis of brigade staff performance. Finally, the training needed to be as close to turn-key as possible, so that it could be exported to user units.

These requirements were endorsed in 1994 by congressional staff members who observed the VTP work being completed and underscored the potential for using simulation to address other training challenges. Program direction and the requisite resources were provided and action was begun by ARI and FXXITP on addressing this significant training requirement.

ARI and its contractors (HumRRO, Raytheon, TRW S&ITG, and Litton PRC) designed and developed the required program, entitled the *Combined Arms Operations at Brigade Level, Realistically Achieved Through Simulation (COBRAS) Brigade Staff Exercise (BSE).* The COBRAS BSE shares with the VTP the key design features:

- The BSE is simulation-based. By using constructive simulation technologies (BBS), the brigade staff could perform in an environment that simulates their command posts (CPs). Trained controllers and role-players at the simulation stations communicate by radio to portray activities of the enemy and subordinate units.

- The BSE is structured. The thorough job and task analysis performed during the design phase was used not only to generate the training objectives, but also to provide the basis for the tactical cues for the brigade staff during mission planning, preparation, and execution.

A complete TSP was constructed as the final training program deliverable. Like the VTP, the TSP contains the specifications and electronic files that control the simulation itself, guidance and materials for unit preparation, observer guides and observation aids, AAR materials, and a complete set of tactical materials (orders, overlays, and scripted messages) to drive unit performance. Unlike the VTP, no dedicated O/C team is required to assist in implementation; the TSP materials are designed to support exportable training.

An additional feature of the BSE is that the scenario is congruent with the scenario that underlies the VTP. Both sets of exercises derive from a common set of higher-echelon (division) missions, using virtually the same task organization, terrain, and enemy situation. The added focus on planning and preparation, and on CS and CSS, reflects the additional responsibilities and assets given to brigades.

The BSE was designed to focus the BCT on one mission at a time and to run less than 24 hours a day, allowing its training audience to deal with a simplified environment while complimenting, reflecting on, and refining the way they go about their basic decision-making and troop leading procedures.

The most recent development effort is the *COBRAS Brigade and Battalion Staff Exercise (BBSE).* It was formulated in concept during development and implementation of the COBRAS BSE, and expands the training audience to include multiechelon representation from the BCT. Members of the brigade's maneuver battalions participate in the full planning, preparation, and execution processes of the missions, with simulation interface occurring at the company level.

The BBSE is more complex than its predecessor in two other ways. First, it presents a more challenging battle rhythm for the BCT. The exercise is implemented using a 24-hour training schedule, requiring the brigade and battalions to deal with shift changes and realistic battlefield fatigue. It also requires simultaneous current mission execution and next-mission planning, so that the brigade must plan for handling concurrent operations.

Second, the BBSE targets performance that will bring the BCT to a high pitch of proficiency and excellence in selected key areas. The performance objectives were formulated after review of National Training Center (NTC) performance trends and examination of advanced techniques and procedures from the Center for Army Lessons Learned. The exercise is intended to provide units with the highest intensity home-station training possible, prior to deployment to a real-world mission or to the NTC. As an NTC precursor, the exercise should allow units to be prepared to take advantage of the expertise of the NTC O/C team and the realistic training conditions found there.

While there were many other structured simulation-based programs under development by ARI, these three are seminal:

- The VTP provided the first structured training program to leverage virtual simulation, and led to formulation of the methodology for developing such programs. It also produced the first models for TSPs.

- The COBRAS BSE accomplished the integration of CS and CSS activities in a structured exercise, and expanded the scope of the exercise beyond execution only, to include mission planning and preparation.
- The BBSE, as a multiechelon exercise with an intense battle rhythm, pushed the limits for exercise support in order to provide a highly realistic environment and focused feedback for all elements of the training audience.
- All three of these efforts delivered structured training; all three were tailored for the specific configuration of training audience and simulation; and all three were supported by complete, comprehensive TSPs. Thus, they are models of the principal structural characteristics of the emerging STOW exercise.

When the time came for development of the exercise and TSP for the STOW trial, the development team of FXXITP, 16th Cavalry, ARI, and the COBRAS developers had a significant base of knowledge and experience to draw on.

Linked Simulation Exercises

Simulation development has advanced rapidly in the past 10 years. In the early 1990s, there were at least 20 different systems of simulators, both virtual and constructive, in operational status within all of the services. It soon became apparent that these systems were not using the existing technology effectively, and two related initiatives were pursued. The first was to allow remoting of simulations, where multiple simulations at different geographical locations could be made to interact. Remoting allowed soldiers to train with other soldiers while remaining at their home station. The second part of the equation was to link dissimilar simulations so that systems that were designed for a particular representation (for example, specific weapon systems, logistics, threat, command and control) or for a particular service (Army, Air Force, Navy, and Marine Corps) could interact. Linking allowed the specialized models and simulators in the Army and Joint services, each of which is effective in its own area, to conduct more realistic operations and wargaming.

The initial impetus for remoting and linking was at the highest levels of command and concentrated on linking modeling from the Army, Air Force, Navy, Marine Corps, U.S. Space Command, and the Joint Command and Control Warfare Center. Called the Joint Training Confederation (JTC), the first successful linkage was conducted as part of the Return of Forces to Germany in 1992. Further major JTC exercises, again concentrating at the commander-in-chief level, continued through the mid-1990s.

At the same time, experimentation continued on linking simulations at a lower operational level. The DIS program was designed to link separated autonomous simulations, without the requirement for a central common computer, that could interact and fully communicate with each other. The DIS was initially an extension of SIMNET, but later was extended to include all types of virtual, constructive, and live simulation. The DIS has expanded into an extension of the concept called high level architecture (HLA). The HLA will be used for future developmental simulator systems such as the Warfighters' Simulation (WARSIM) 2000 (NSC, 1996) and the STOW.

The STOW is a Department of Defense (DOD)-level Advanced Concept Technology Demonstration (ACTD) designed to develop, integrate, and transition the technologies necessary to demonstrate the potential of high resolution, platform-level simulation to support joint command and staff training and mission rehearsals. The technology is being developed under the Defense Advanced Research Project Agency, sponsored by the United States Atlantic Command.

There are four main components to STOW: Synthetic Forces, Synthetic Environment, Advanced Simulation Network (Defense Simulation Internet); and Simulation Infrastructure. The STOW ACTD underwent a series of full system tests during calendar year 1997, culminating in a STOW Demonstration in late 1997. Results from the tests and demonstration are being evaluated and are forecast to be available by the late spring of 1998.

The Army's STOW efforts were part of the overall DOD initiative. In 1994, the Army's STOW-Europe (STOW-E) demonstration linked a live instrumented TF of M1A1 tanks at the Combat Maneuver Training Center in Hohenfels, Germany; a TF of simulated tanks in SIMNET at Gräfenwoehr, Germany, a mechanized infantry TF in BBS at the Hohenfels Simulation Center; a U.S. Air Force F-16 Falconstar simulator, also at Gräfenwoehr; and AH-64 attack helicopter simulators in AIRNET at Fort Rucker, Alabama.

Subsequent demonstrations that built on the STOW-E experience were conducted by the National Simulation Center (NSC). In a STOW exercise in September 1996 (STOWEX-96), a brigade exercise was conducted in which two TFs in constructive simulation at Fort Riley, Kansas were linked with a TF in SIMNET at Fort Knox (NSC, 1997). These efforts were primarily focused on demonstrating the technology capability and less on the training provided to the unit. They included significant overheads and manual control of various elements of the STOW simulations. They set the stage for a training-focused demonstration that would also provide information on how far the technology had progressed and where it still needed work.

Development and Implementation Plan

Preparation for the STOW Exercise Trial

The COBRAS team's involvement with the STOW exercise planning began in June 1997, when the taskings for exercise trial planning and oversight, TSP development, and evaluation were delineated by ARI and FXXITP. Figure 2 summarizes the milestone events in the preparation and development process for the STOW-ET in each of these three major areas of activity.

Exercise Trial Planning

As shown in Figure 2, the initial planning for the exercise trial concerned four topic areas:

- Resources, including the simulation components that would be used; the physical locations and facilities for those components and for the participating unit; communications needs to support the exercise control and the participating unit; and staffing for simulation workstations, the observer teams, and the technical control personnel.
- Scheduling, not only of the trial itself but of the various critical events leading up to the trial, the events associated with the equipment training in preparation for the exercise, and the training events during the exercise.
- Participating unit and level of staffing and participation.
- Training objectives and scenario conditions.

The STOW Concept was the guiding documentation that contained the most current decisions throughout the nine-month preparation period. It evolved from a short statement of goals and basic STOW components to a lengthy compendium of the conditions for the exercise trial. In its final form, it served as a complete reference to the decisions that had been made, assignment of responsibilities, milestones, and expectations. The content of the STOW Concept is summarized in this report in the next section, "Implementation Conditions."

During the nine months prior to the STOW-ET, numerous trials using the STOW-A components were conducted. This enabled COBRAS developers to try out the scenario conditions and the tasks in the STOW environment and to see how the simulations would react. STOW developers used these trials to identify technology components requiring additional refinements. Because of the close working relationship among all of the teams who were stressing the STOW components and capabilities, the training and simulation development were able to proceed in parallel. However, the ability of the COBRAS training developers to keep up with STOW simulation developers was eventually strained to the limit, and the final STOW refinements were not fully advantaged in the exercise TSP.

June 1997	Initial STOW Concept trial conducted using BBS 5.0 and ModSAF 1.5.1 and ModSAF 2.1 software (STOW 1.5 software package); supported by NSC and Simulation Training and Instrumentation Command (STRICOM) personnel
	Initial STOW Concept options developed
	3rd Bde, 42nd ID (M) signs up as the STOW Trial brigade
	Initial review of Fort Knox (FXXITP) STOW-A 1.5 Handbook
July 1997	Initial meeting with 3rd Bde, 42nd ID (M) and FXXITP, ARI and COBRAS. Initial decisions: DATK mission, brigade organization (2 Armor, 1 Mech), one armor heavy TF in SIMNET
	Initial STOW commo plan developed
August 1997	STOW Concept revised based on July meeting with 3rd Bde, 42nd ID (M)
	STOW Concept briefed to 3rd Bde, 42nd ID (M) and 42nd ID (M) Cdr at Fort Drum
	STOW Concept and initial unit training plan briefed to Warthog Team
	STOW Concept and training plan revised based on Warthog resource limitations and issues raised by TF 1-101 Cdr
	Tactical product and scenario development commence
September 1997	3rd Bde, 42nd ID (M) Cdr agrees to revised STOW Concept and training plan
	Subsequent review of Fort Knox (FXXITP) STOW-A 1.5/1.6 Handbook
	Determination of a need for specific manuals for each key technical control position
October 1997	Initial reconfigurable simulator Concept trial conducted
	STOW link made to BBS and ModSAF
November 1997	Warthog Team conducts initial VTP training coordination meeting with TF 1-101
	STOW commo plan revised and hardware installation requests submitted
December 1997	STOW 1.6 software training at NSC, BBS-STOW 1.6 software (BBS 5.1.x) obtained
	ModSAF & OPSIN parts of STOW 1.6 software package (ModSAF 3.0.x and OPSIN 3.0x) obtained from STRICOM
	Second STOW Concept trial conducted using BBS 5.1.x and ModSAF 3.0.x software (initial STOW 1.6 software package version)
	Tactical products and scenario revisions, TSP materials development
January 1998	Revised reconfigurable simulator Concept trial conducted
	Briefing to SOCT: STOW overview, DATK Div OPORD brief, site setup
	Tactical products and scenario revisions, TSP revisions
	Preparation materials sent to 42nd ID (M)
February 1998	Briefing to Warthog Team: STOW overview, DATK Div OPORD brief, site setup
	Briefing to USAARMC leadership on STOW Concept and progress
	Briefing to Warthog Team on representing CSS in STOW
	Final STOW software package installed, initialization and archive files recorded
	Final STOW trial (rehearsal) conducted with FXXITP, simulation site personnel, COBRAS, Warthogs, and SOCT
	VTP by TF 1-101 with Warthogs
March 1998	STOW Exercise Trial with 3rd Bde, 42nd ID (M) and TF 1-101

Figure 2. STOW Exercise Trial preparation and development milestones.

TSP Development

Development of the STOW-ET TSP followed the methodology used for previous structured simulation-based programs (Campbell & Deter, 1997), with specific application for the peculiarities of the STOW environment and expanded training audience. Development of the scenario and tactical materials began first, because these items were required in order to build the simulation files, which were in turn needed in order to test and refine the STOW linkages.

The training audience performance objectives were derived from products used in the VTP and BBSE. Specifically, the performance objectives for the scout platoon, support platoon first sergeants (1SGs), and company commanders were taken from the VTP, with slight modifications to cover the planning and preparation processes (not included in the VTP). Performance objectives for the battalion commander and staff and the brigade commander and staff were modeled on the BBSE. The specific performance objectives are shown in **Figure 3**.

Training Audience Level	Performance Objective
Brigade Commander and Staff	Military Decision-Making Process (MDMP) Plan and Manage Reconnaissance (Recon) Execute the Brigade Deliberate Attack (DATK)
Task Force (TF) Commander and Staff	MDMP Plan and Manage Recon Mission Execution
Company Team	Plan and Execute Company Operations as Part of a TF DATK
TF Support Platoon and Company First Sergeants	Plan and Execute Support for the TF
Scout Platoon	Plan and Execute Scout Platoon Operations as Part of a TF DATK

Figure 3. COBRAS STOW exercise performance objectives.

For the most part, the general architecture of the STOW-ET materials was also similar to that of the COBRAS BSE and BBSE. The challenge was to identify all of the new staffing and operating requirements brought on by the advanced technology, to specify which individuals would need to have information on use of the technology, and to clearly present that information.

The other aspects of the STOW-ET did not materially affect the TSP design and structure. Earlier ARI projects included brigade/battalion exercises as well as battalion and below exercises (as described earlier), so TSPs for different training audience configurations already existed to serve as models for the unit preparation materials.

However, because the participating unit was a National Guard unit, there were implications for how the TSP was constructed and distributed. Because of their compressed training opportunities, they would have significantly less time than do active units to prepare for the exercise, as a unit or in their staff sections. Therefore, the unit preparation materials would

have to be even more succinct than usual, with additional information presented in briefings by the O/Cs, COBRAS team, or simulation site personnel.

Because the STOW-ET was tailored to an evolving technology and a specific training unit and staffing, a complete and exportable TSP was not required. The many agencies and developers listed earlier would be closely involved in planning and implementation, even to the point of assisting with orientations for the O/Cs, training for the simulation interactors, and briefing all of the training audience and supporting participants. As described below (under *Supporting Participants*), many of the participants outside the training audience were drawn from the exercise development teams, meaning that certain portions of the TSP would not be needed for the trial.

The fact that the STOW technology was not yet mature was an additional complication. Even TSP materials that were prepared for use in the trial might not survive as part of a final TSP, because technology modifications as a result of the trial could require significant changes.

The TSP was therefore designed as the minimum set of materials required to support the conduct of the exercise. The activities performed by developers playing roles of supporting participants would be documented and would be either written into TSP materials after the trial or identified for further development. To the extent that changes to the STOW technology were required or recommended, portions of the TSP would be filled by "placeholders" indicating the additional developmental need.

One of the assumptions affecting construction of the TSP included the provision that the exercise would be Fort Knox based for the trial as well as for any future implementations. At Fort Knox, implementation would be able to take advantage of the experience of dedicated O/C teams (the SOCT and Warthogs) and the simulation site's technical support staff for STOW linkage. The linkages and communications infrastructure would be in place, and could be used for subsequent exercises. Therefore, the TSP could be written for a single set of conditions, rather than accounting for the variations that could occur at different exercise sites and units.

Implementation Conditions

This section describes the implementation conditions for the March 1998 Fort Knox STOW exercise trial. It represents the content of the STOW Concept in its final form prior to the trial.

Participating Unit

In order to fairly evaluate the technology and the training support requirements, participation of a representative U.S. Army BCT was required. The 3rd Bde of the 42nd ID (M), a National Guard unit from New York, volunteered to participate, as an adjunct to one of its battalion's annual training. The 3rd Bde was organized as two armor and one mechanized infantry battalions, with supporting field artillery, CSS, engineer, and chemical units. Only one battalion TF (TF 1-101) deployed to Fort Knox with the 3rd Bde. That battalion had already signed up to use SIMNET and the VTP at Fort Knox. Thus the brigade's decision to participate in the STOW-ET was a logical step up from that plan, although in terms of expense and effort it was a significant additional investment.

The brigade and division leaders were well aware of the risk involved in participation in an experimental effort such as this. However, they judged that the training value afforded by

simply participating in a brigade/battalion exercise under the guidance of a professional O/C team and the use of a structured scenario and support materials would justify the effort and expense. Any training value added by the virtual and constructive simulation representations of the battlefield systems and effects would be lagniappe.

Participation by the 3rd Bde did not actually involve the entire brigade, of course. Figure 4 shows the primary training audience members. They include selected members of the brigade staff and one of its maneuver battalions. The members of the primary training audience received focused observation, guidance, and feedback. Other members of the BCT, including members of staff sections and subordinate units, were regarded as supporting participants.

This distinction between "training audience" and "supporting participant" was of little importance during the conduct of the exercise. All members of the unit performed activities appropriate to their roles within the BCT. The distinction is of practical value only in designing and developing the performance objectives, TSP materials, and observation and feedback plan for the exercise.

Primary Training Audience Members	
3rd Brigade	**Task Force (TF) 1-101**
Brigade Commander	TF Commander
Executive Officer (XO), S1, S2, S3, S4	XO, S1, S2, S3, Chemical Officer (CHEMO), S4
FA Battalion Commander (FSCOORD)	Fire Support Officer (FSO)
Fire Support Officer (FSO)	TF Engineer
Engineer Battalion Commander	Company Commanders and 1SGs
Forward Support Battalion (FSB) Commander	Support Platoon Leader
	Scout Platoon Leader and Section Leaders

Figure 4. Primary training audience members for the STOW-ET.

Simulation Technologies

A variety of technology innovations were brought together to support the STOW-ET, including the various components of the Army's STOW architecture with DIS and the reconfigurable simulators.

The STOW architecture requires the integration of the separate environments of BBS and SIMNET by means of the DIS. For the STOW-ET, the simulation components were located in three different physical locations on Fort Knox, linked by a local area network, as diagrammed in Figure 5. The two SIMNET buildings (2020 and 2021) are collocated, while the third (Skidgel Hall, Building 1724) is about a half-mile away.

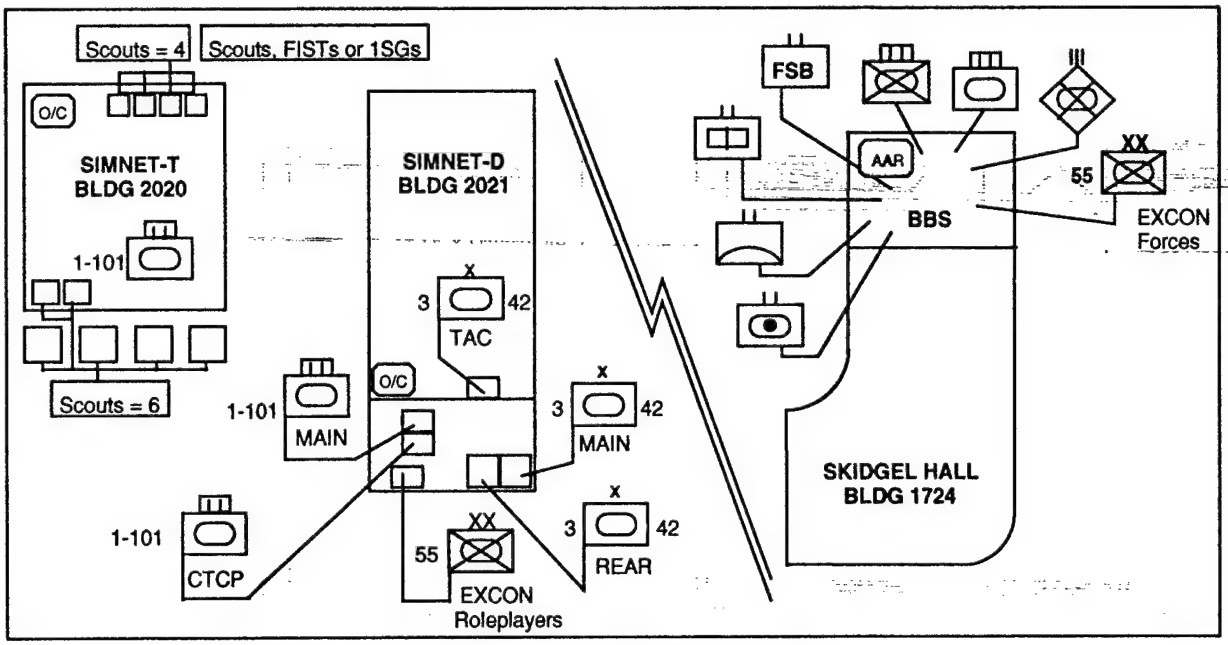

Figure 5. Locations of simulation components for the STOW-ET.

The key to the linkage is the DIS. Within the DIS hub, Translator Cell Interface Adapter Units (XCIAUs) filter the DIS protocols for interface and provide two-way translations between BBS and SIMNET. Both BBS and SIMNET are served by dedicated XCIAUs.

The STOW-ET used a STOW-A (version 1.6) with some modifications and additions for the exercise. The BBS component used was a variant of BBS 5.1 called BBS 5.1.1a, which provides particular STOW links. The ModSAF used was ModSAF 3.0.23 (alpha release, modified), which provided local changes to selected reader files.

The DIS also provided the linkage to the reconfigurable simulations. Two types of reconfigurable simulators were used: the Advanced Research Projects Agency (ARPA) Reconfigurable Simulator Initiative (ARSI) and the Reconfigurable Combat Vehicle Simulator (RCVS). Both are often referred to as Desktop Reconfigurable Simulators (DRSs), although the ARSI system is a full compartment. Unlike SIMNET vehicle simulations that represent tanks and IFVs, the software and physical cabinets of the reconfigurable simulations can be used to portray a variety of military vehicles, including trucks and high mobility multipurpose wheeled vehicle (HMMWVs). These capabilities enable more participants, including the brigade commander, scouts, support personnel, and medical personnel, to interact in the virtual battlefield environment. Using simulators that more closely replicate their customary vehicles, they can perform tasks and observe activities in a more realistic fashion than was provided with BBS or SIMNET.

In summary, the STOW-ET employed linkages among the virtual simulations of SIMNET and the reconfigurable simulators; and the constructive simulations of ModSAF and BBS. The linkage points were provided by DIS XCIAUs. A conceptual depiction of the linkages is shown in Figure 6. A more technical description is given in the *Fort Knox STOW-A 1.6 Handbook* (DTDD, 1998).

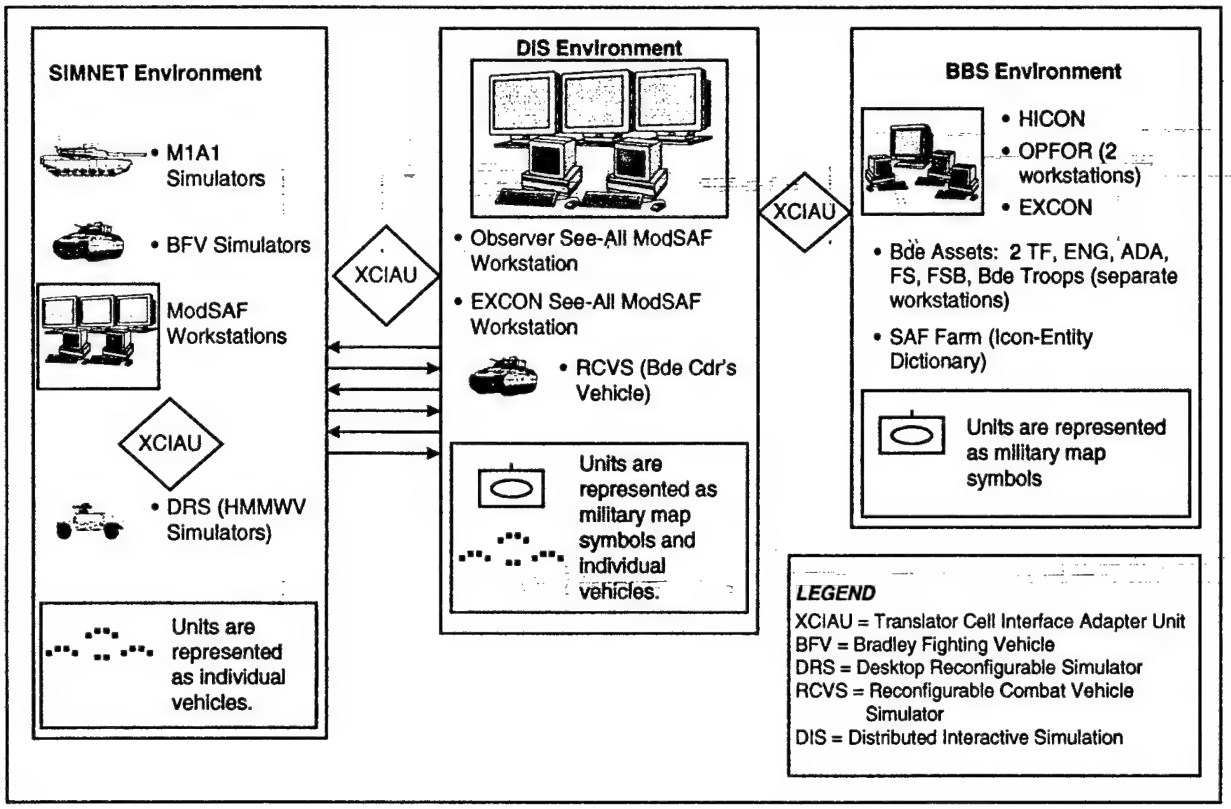

Figure 6. Conceptual depiction of STOW-ET linkages.

Communications

Although communications networks for participating units were in place for both SIMNET and BBS, the multiechelon nature of the exercise demanded additional networks for the units and also for the observers and exercise management (as shown in Figure 7). This ambitious expansion to the existing communications infrastructure was not intended as a permanent, final solution to the communications needs for this and all future STOW or multiechelon exercises. Rather, it was to serve the needs of the STOW-ET and permit assessment of the basic plan and delineation of future needs.

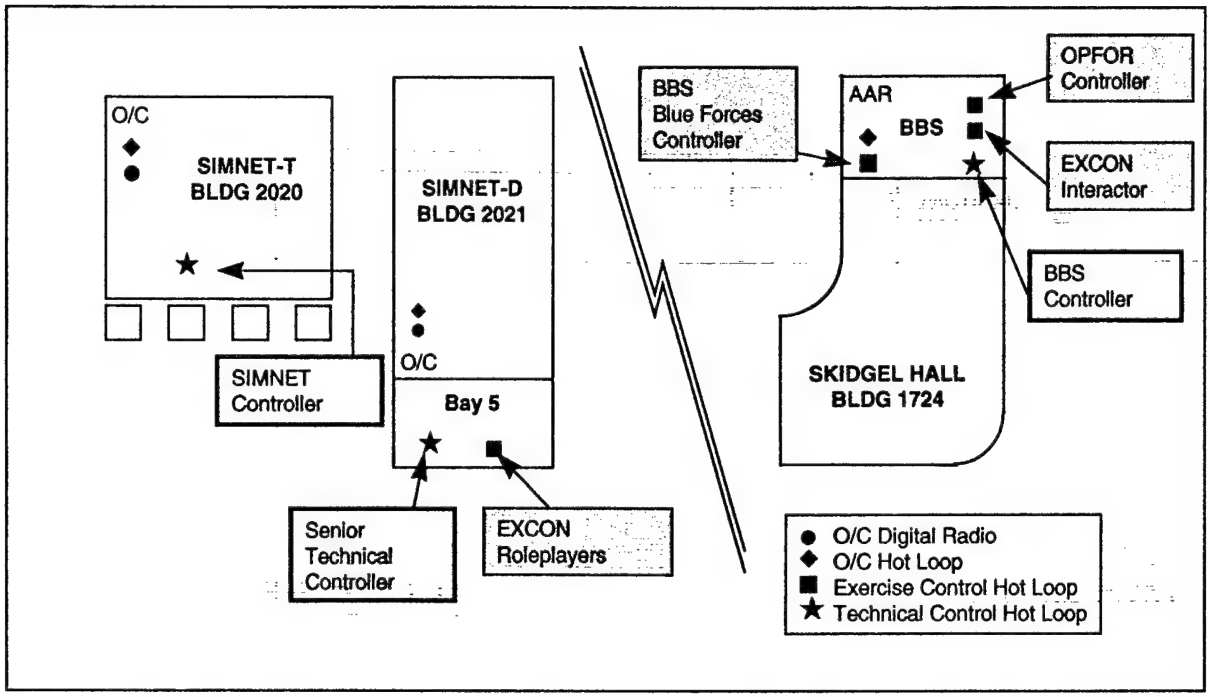

Figure 7. Communications layout for the STOW-ET.

Participating Unit Use of Simulation

Figure 8 portrays the 3rd Bde and TF 1-101 organization and simulation representation for the STOW-ET. The 3rd Bde staff occupied main, rear, and tactical CPs located inside the SIMNET-D facility. The 3rd Bde Commander also had the ARSI reconfigurable simulator for use as his command vehicle, allowing him to move around on the battlefield and observe the virtual (SIMNET and the other reconfigurable simulators) and semi-automated (BBS- and ModSAF-generated) forces.

TF 1-101 participated with three armor companies and one mechanized infantry company. The battalion staff operated a main CP and combat trains CP (CTCP) inside the SIMNET-D facility. The TF used the 40 M1A1 and 10 Bradley Fighting Vehicle SIMNET simulators for its maneuver elements. The reconfigurable simulators were used as the fire support team vehicles (FIST-Vs) and 1SG vehicles (HMMWV); one 1SG operated from a ModSAF workstation. CSS functions for TF 1-101 were actually controlled and accounted for in BBS. The platoon leader and section leaders of the TF 1-101 scout platoon occupied 5 of the reconfigurable simulators (configured as HMMWVs); the other section vehicles were generated by ModSAF.

The remaining 3rd Bde assets, including the other two TFs, were represented by response cell teams who controlled the functions from BBS workstations. Division assets were controlled from a BBS workstation by members of the 42nd ID (M) staff, serving as the division response cell (also referred to as exercise control [EXCON]). They were supplemented and assisted by COBRAS and FXXITP staff. The OPFOR was also controlled from BBS workstations, and was staffed by COBRAS and CLS personnel.

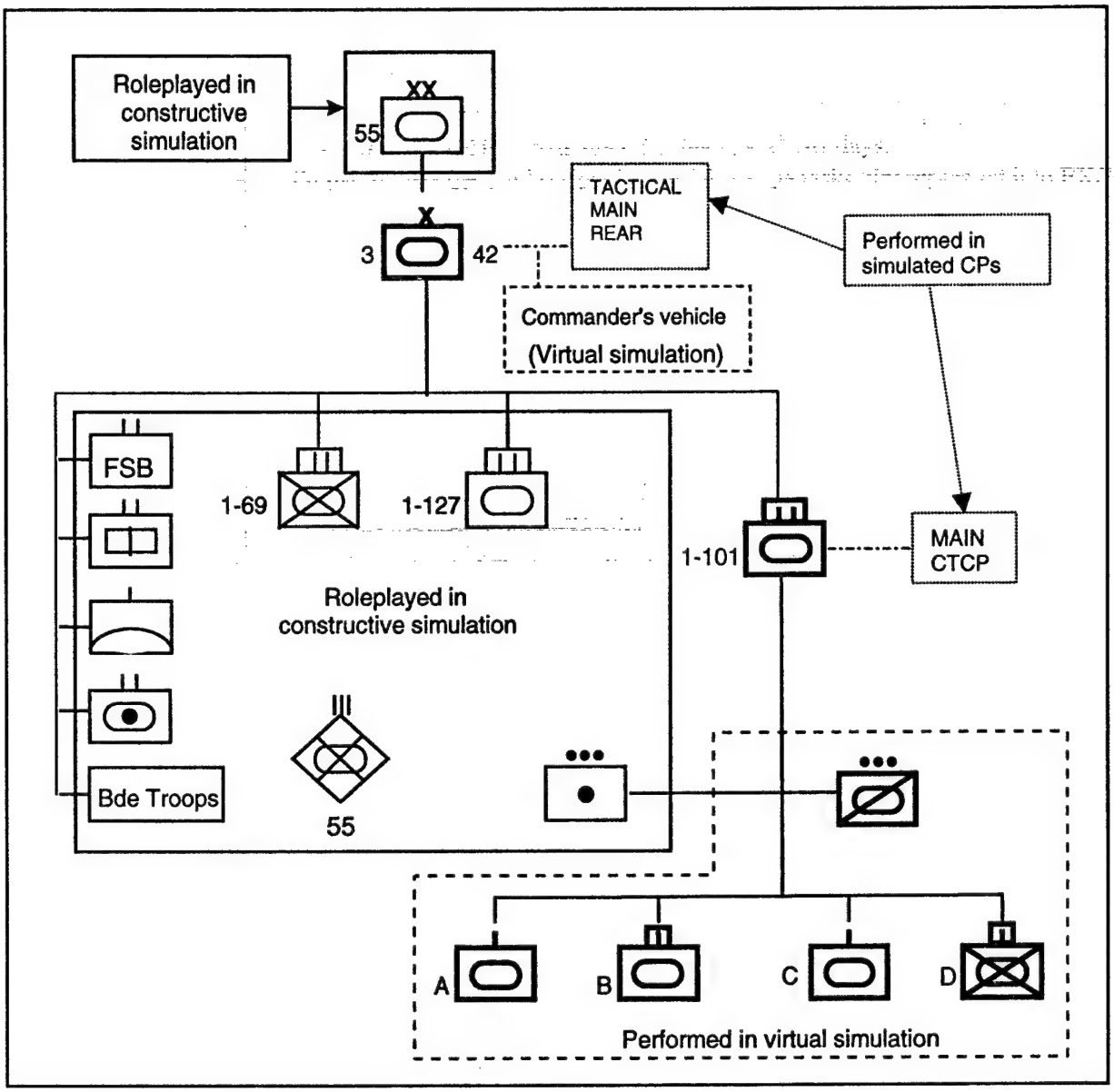

Figure 8. Simulation usage by the participating unit and supporting personnel.

Training Support Packages

The structure of the STOW-ET TSP and the general content of specific components are shown in Figure 9.

The training audience guides were presented as job aids that described the activities within the objectives, rather than full guides for exercise preparation, because of the limited preparation time available to the training audience (as described in the next section). However, the necessary preparation materials that would enable the staffs to begin their tactical preparation were provided several weeks before the exercise. These included background scenario information, overlays showing starting dispositions, and descriptions of unit readiness levels at the start of the exercise.

Tactical materials: *Complete draft provided for the STOW-ET*

Division Warning Order, 2 intelligence summaries (INTSUMS), and start of exercise (STARTEX) overlay. Provided to the unit prior to the exercise for use in preparation.

Division OPORD for the deliberate attack, with overlays.

Prepared messages and scripted materials to cue tasks. Incorporated into EXCON Role-player and Workstation Guides.

Descriptions of personnel and equipment status to set the scenario conditions. Provided as Initial Situation Package to the unit, role-players, and observer teams.

Preparation materials for training participants: *Complete draft provided for the STOW-ET*

Exercise Guides for:

- Brigade
- Battalion TF
- Company Team
- Support Platoon Leader
- Scout Platoon Leader

Each guide contains an exercise overview, description of the trial, exercise schedule, definition of the performance objectives, feedback session schedule and participants, and complete performance analysis and references for each performance objective.

Provided to training audience members as soon as they arrived for the STOW-ET.

Guidance for other participants: *Complete drafts provided for the STOW-ET*

Observers:

- Observer Guide, containing an overview of the exercise and the trial, description of observer role and preparation, and guidelines for feedback sessions
- Specific Observation Packages for observers of the:
  - Brigade
  - Battalion TF
  - Company Team
  - Support Platoon Leader
  - Scout Platoon Leader

  Each specific observation package contained the performance objectives for the appropriate audience, including description of the expected activities and outcomes, assessment considerations, and references
- Feedback slide packages (PowerPoint®) for Brigade and Battalion TF performance objectives, highlighting expected activities and outcomes at scheduled feedback session times in the exercise

All observer materials provided to the SOCT or Warthog personnel by COBRAS staff along with complete orientation briefing and question/answer session

Continued on next page

Figure 9. Structure and content of the STOW-ET training support package.

Guidance for other participants (continued): *Complete drafts provided for the STOW-ET*

OPFOR Cell: OPFOR Guide describing the exercise, OPFOR team responsibilities and activities, OPFOR order of battle and mission execution; also contains the Road to War, BBS guidelines specific to the STOW exercise, and job aids.

EXCON (Division Response Team):

- Role-player Guide, describing team composition and activities of role-players; includes Road to War, scenario timeline, mission execution sketches, prepared messages, response guidelines
- Workstation Guide, describing the team composition and activities of interactors; includes Road to War, BBS guidelines specific to the STOW-ET, and job aids

Workstation Teams: Specific guides for each BBS workstation team of role-players and interactors:

- Forward Support Battalion
- Engineer
- Fire Support
- TF 1-101 (required to represent TF activities during initial planning and preparation)
- TF 1-69 and TF 1-27
- Scout Platoon (backup materials in case reconfigurable simulators malfunctioned)
- Brigade Troops

Each guide contains a description of the STOW-ET and exercise goals, rules of engagement for the exercise, job aids, and the Initial Situation Package appropriate to the station.

Administrative guidance for managers of the training: *Draft of information needed for DATK mission provided. Planning and preparation and exercise management guidance to be added following the trial.*

Exercise Guide for the Exercise Director: containing an overview of the trial, information about the DATK planning, preparation, execution, and consolidation and reorganization, and description of the other participants and their activities

Simulation files and documentation: *Tapes and partial drafts of manuals provided for the STOW-ET, with other content to be added based on STOW-ET outcomes.*

Technical Control Manuals containing exercise overviews, descriptions of responsibilities; exercise control checklists, start-up, shut-down, and troubleshooting procedures, signal operating instructions.
Specific content for the individual controllers includes:
Senior Technical Controller: Exercise planning and coordination
DIS/STOW Controller: Training for the brigade commander on the reconfigurable simulator
BBS Controller: BBS workstation training and practical exercises for interactors; initialization and archive data for BBS; weather data to be input to BBS
SIMNET/ModSAF Controller: training for scout or support platoon users of the reconfigurable simulator; plansheets for data input to SIMNET, ModSAF, and the reconfigurable simulators

Figure 9. Structure and content of the STOW-ET training support package (continued).

The Exercise Director would usually be a member of the training unit's parent command, and should be involved in exercise planning and preparation no later than 60 days prior to the implementation. That planning figure, however, will work only for a full-time AC unit. For a reserve component unit such as the 42nd ID (M), the same amount of preparation could take up to a year. Therefore, the preparation activities that would normally involve the Exercise Director were performed by the COBRAS team, under the direction of one staff member referred to as the

Trial Director. The 42nd ID (M) Assistant Division Commander-Support arrived for the exercise with the brigade, and from that point on worked with the Trial Director to control the training. His Exercise Guide, which would usually be filled with planning and preparation guidance, contained only an introduction to STOW and the STOW-ET, and the specific guidance needed during the mission planning, preparation, and execution.

Guidance and orientation for the observer teams (Warthogs and SOCT) was presented during workshop-style settings, rather than being provided only in printed materials. This approach allowed the COBRAS team to give more detailed information and answer questions. This type of direct delivery is the preferred approach, but is not an option with exportable packages such as the BBSE.

Exercise control activities for a STOW exercise are considerably more complex than for single simulation exercises. In both SIMNET and BBS exercises, one competent technical controller is sufficient to monitor simulation activities and effect corrections. However, for the STOW exercise, four such controllers were required: the senior technical controller, the BBS controller, the SIMNET/ModSAF controller, and the DIS/STOW controller. Materials detailing their control activities were prepared for and provided to the four controllers.

Refinement of the TSP after the STOW-ET was to be limited to the correction of any errors discovered in the tactical materials and simulation materials and completion of the Exercise Guide. Other modifications based on observations would not be appropriate because the STOW technology and infrastructure were still undergoing revision, and the TSP must eventually be written to be consistent with the final configuration. Within that general guidance, the development team took the opportunity to update, add to, and improve many of the TSP components before they were submitted as a deliverable.

Supporting Participants

In its final form, a STOW exercise of this nature would require some 350 participants. These would include personnel in the positions shown in Figure 10.

As a National Guard unit far away from home, the 3rd Bde and its parent unit were unable to staff all of the role-player and interactor slots required for an exercise of this magnitude. As a result, some of these positions were filled by COBRAS team, simulation site, or FXXITP personnel. All of these individuals had been involved in the building and proofing of the exercises, were intimately familiar with the requirements and tasks, and required little or no TSP guidance beyond a few job aids.

The observation and feedback functions were provided by members of the Warthog O/C Team and the Senior O/C Team. Both teams had experience with SIMNET and Janus exercises. Additionally, the Warthog O/Cs were very familiar with using structured simulation-based exercises and the associated TSPs. However, none of the exercises that they had previously supported had been multiechelon to the extent that the STOW-ET would be, nor had they included significant mission planning and preparation phases or intense CS and CSS activity. The observer TSP materials and training were therefore specific to the context of a multiechelon, multi-phase exercise.

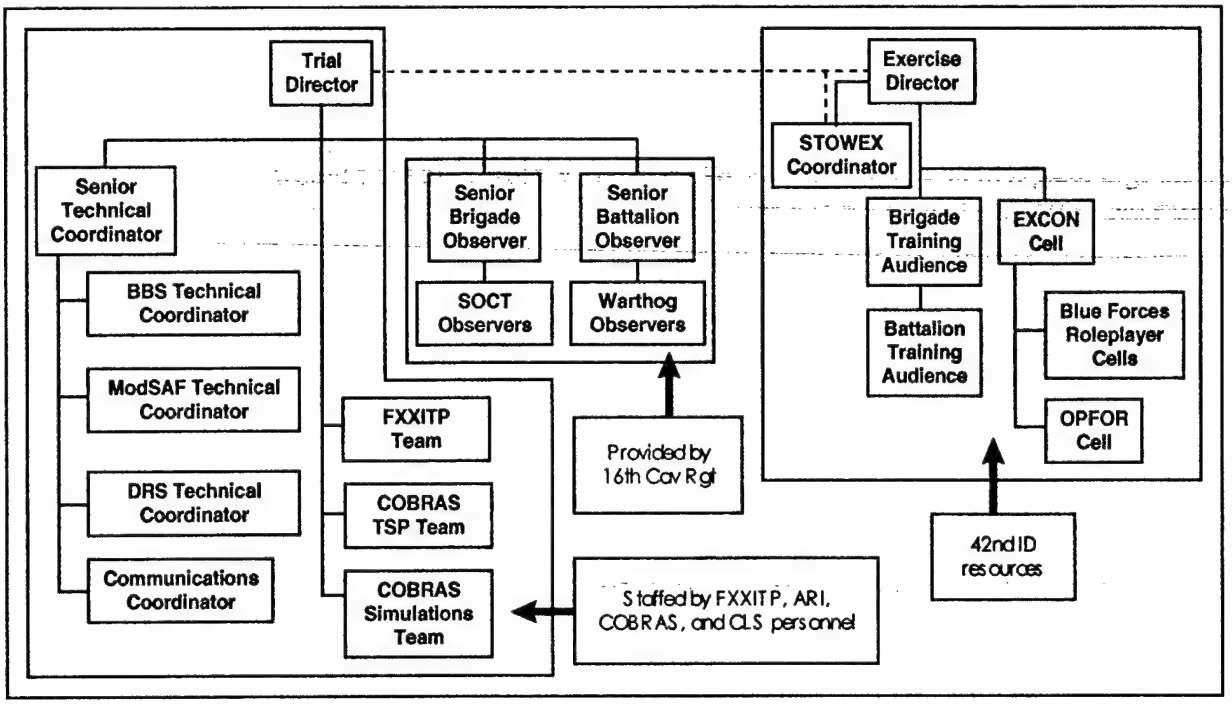

Figure 10. Staffing for the STOW-ET.

STOW-ET Schedule

One of the reasons that 3rd Bde, 42nd ID (M) was able to support the STOW-ET was that TF 1-101 was already planning to conduct VTP exercises during the last week of February 1998. For the brigade, it was a logical progression to move from platoon, company, and battalion exercises to multiechelon training for company through brigade.

The participation in the VTP was also useful for the COBRAS development effort, because it would provide familiarization with SIMNET and the reconfigurable simulators, prior to the STOW exercise. It would also give TF 1-101 an opportunity to practice the necessary deliberate attack (DATK) preparation and execution activities, with observer coaching and feedback, before working with the brigade commander and staff.

It was important to develop a schedule for the two weeks that would make optimal use of the training time. One issue concerned the brigade's planning time: Once the division order was given to the brigade staff, they would likely take 1-2 days planning before their order would be issued to the battalion. Parallel planning between the battalion and the brigade should be occurring, but there would be little activity for the companies until sometime on the third day after the division order was issued. This was not totally realistic: During brigade planning time in the field, subordinate units are busy with a variety of tasks in preparation for their role in the mission. However, few of these can be replicated in the world of simulation, and few were the target of the intensive training period.

As a result, a schedule was constructed that would provide the greatest opportunities for valuable training (shown in Figure 11). It included VTP training, progressing from platoon and company exercises to a battalion exercise, during the first week. The remainder of the training

audience and supporting participants would arrive at the end of that week and begin the STOW-specific exercise with receipt of the division order. During their initial planning, TF 1-101 would be represented in BBS, just as were the other subordinate units; the real TF 1-101 would be completing its VTP exercise. By the end of the first day of the STOW exercise, TF 1-101 staff would transition from VTP to STOW-ET to do their parallel planning; the companies and platoons would stay in the VTP and continue training; TF 1-101 maneuver elements would still be in BBS. Late on the second day, the company commanders and scouts would also begin to transition from the VTP to STOW-ET, and on the third day, the STOW-ET would be fully operational.

Unit	Prior Week	Day 1	Day 2	Day 3	Day 4	Day 5
Brigade Staff		Receive Div order, begin planning	Continue planning through order production	Issue order, complete recon planning	Begin recon, conduct rehearsal	Execute
TF Staff	*VTP*	*VTP*	Begin planning, parallel plan with bde	Receive bde order, continue planning through order production	Begin recon, bde rehearsal, issue order, conduct TF rehearsal	Execute
Company Teams	*VTP*	*VTP*	*VTP*	Troop leading, begin planning	Receive order, plan, TF rehearsal	Execute
Support Platoon	*VTP*	*VTP*	*VTP*	Begin planning CSS support	Receive order, plan, TF rehearsal	Execute
Scouts	*VTP*	*VTP*	*VTP*	Recon planning	Conduct recon	Complete recon

Figure 11. Training schedule for the VTP and STOW-ET.

A schedule for feedback sessions was also prepared. It was based on several premises:

- Each feedback session should last no more than 1-1/2 hours; 1 hour was desirable
- No more than three performance objectives would be planned for discussion within a single session; two topics per session were desirable
- Sessions for each echelon/segment of the training audience would be scheduled at least daily
- Sessions would be timed so that unit leaders could attend sessions with their subordinate units, as appropriate

The feedback session schedule is shown in Figure 12. While the schedule does not show echelon-specific sessions every day, training audience members did participate in daily sessions,

usually along with their higher headquarters. When the company personnel were still in the VTP, their feedback sessions were conducted according to the Warthogs' VTP schedule.

Feedback Session and AAR Schedule					
Echelon/Function	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Brigade MDMP and Recon Planning	1800	1800	1800		
TF MDMP with Parallel Planning and Recon Planning			0700	0700	
Brigade and TF Recon Execution				1800	
Scout Recon Execution					1600
Brigade DATK Execution					1800
TF DATK Execution					1700
Co/Tm Troop-Leading and Execution					1600
TF CSS Planning and Sustainment					1800

Figure 12. Feedback session schedule for the STOW-ET.

Evaluation

- The evaluation plan for the trial addressed the three research questions:

  What are the unique challenges and considerations associated with training support for a structured STOW-based exercise?

  What simulation and infrastructure capabilities are needed to make STOW-based training possible?

  What is the value added by training in a STOW-based environment?

These questions were expanded and targeted to specific participants in the STOW-ET. The approach to obtaining the necessary data followed the model used in other ARI program evaluation efforts. It included direct observation and documentation of all exercise activities, questionnaires completed by members of the training audience and supporting participants, and individual and group discussions with selected training audience members and supporting participants.

Direct observation of simulation operation was to focus on determining whether the procedures specified in the TSP were correct and easily followed. The tactical situation and development would be observed to evaluate all of the specifications of division order, enemy order of battle, starting conditions, scripted messages, and timing of events. Observation of the training audience and the observer teams would look closely at the quality and utility of the unit's preparation materials and the observation and feedback guidance.

The questionnaires were designed to assess reactions to the exercise trial from training audience members, role-players, interactors, simulation site personnel, and observers. They also asked for basic background information, such as prior simulation-based training experience or

observer experience. Questions for the training audience members and observers asked for their perceptions of the training value of the exercise.

Individual interviews were planned for the brigade and maneuver battalion leaders, while group interviews would bring together various subgroups, including brigade staff, battalion staff, the SOCT, the Warthog observers, and simulation site personnel. Although these same persons would complete questionnaires, the questionnaire data tend to be somewhat superficial, unless an individual chooses to compose a lengthy response. The interviews would provide the opportunity to discuss significant training issues and to probe for reasons or suggestions regarding the comments made on the questionnaires.

Prior to the beginning of the trial, all of the COBRAS developers were instructed on the topics for observation, the targeted questionnaire respondents, and the interview schedule. Observation and interview protocols were prepared to assist the developers during data collection activities. Questionnaires for the specific members of the training audience and support participants were reviewed and approved by ARI.

Results

This section provides a description of the evaluation results for each of the three research areas: training support, technological and infrastructure requirements, and training value. In each area, the basic research issue is described first. This is followed by a summary of the data, including discussion of pertinent comments from the surveys and interviews and input from COBRAS developers. The results are then further aggregated to provide a clearer picture of the findings. Finally, the implications of the findings are presented.

For each research area, implications are discussed in terms of two decision points. One decision point concerns further implementations of STOW-type exercises in the near future, while the other concerns continued research and development on STOW technologies.

Training Support

For structured simulation-based training, the training support requirements include the scenario specifications and TSP as well as the personnel required to implement the exercise. Because of the experimental nature of the STOW-ET, not all of the TSP elements were constructed, used, or evaluated. Instead, developers involved in the trial performed the required duties and, in the process, identified specific contents for TSP materials.

The STOW technology is still under development, and is still subject to continual and frequent improvement. As a result, the training implementation model and the corresponding TSP for using STOW cannot be finalized. The findings described below should be regarded as relevant only to the STOW-ET, although there are valuable implications and lessons for continuing development and testing.

Specific Results Concerning Training Support

Two questions about the TSP were contained in the questionnaires. They asked how thoroughly respondents reviewed the guide, and what they liked, did not like, and would improve about the guide.

As shown in **Table 1**, nearly half of all respondents reported that they read their specific guide, and all but a few at least skimmed the material. The noticeable exception was the group who was in the virtual simulations of SIMNET and the reconfigurable simulators. These were members of the companies of TF 1-101 and the scout platoon. These individuals did not receive their guides until the second day of the second week of training, as they were just about to enter the multiechelon portion of their training period.

Table 1

Indicated Use of Guides

Respondent Group	Number	Read	Skimmed	Did not look at
Brigade Staff Training Audience	18	6 (33%)	12 (67%)	0
Battalion Staff Training Audience	11	2 (18%)	9 (82%)	0
Battalion Members in SIMNET and Reconfigurable Simulators	12	5 (41%)	2 (17%)	5 (41%)
EXCON Workstation Team	3	3 (100%)	0	0
Brigade Workstation Teams	27	12 (44%)	14 (52%)	1 (4%)
Brigade Observers (SOCT)	11	10 (91%)	1 (9%)	0
Battalion Observers (Warthogs)	14	9 (64%)	5 (36%)	0
Overall	96	47 (49%)	43 (45%)	6 (6%)

The responses to the questions on what they liked and didn't like about the TSPs, and what improvements are needed, are contained in Appendix B. The comments from participants and COBRAS observers were content-analyzed, leading to four groups of comments:

- TSP materials,
- staffing for the STOW-ET,
- time and schedule allocations, and
- the training model.

TSP materials. Responses were generally positive from members of the brigade staff training audience, although they did have some cogent observations and suggestions for improvement. Several of the responses indicated that the training audience would like to have samples of various tactical products to use as models. A few such samples had been provided, as they had been in the COBRAS BSE. They also pointed out some errors in the initial situation materials that had caused some confusion during their planning and preparation. These perceived errors have been addressed by COBRAS developers in the final materials. There were comments concerning non-orthodox OPFOR activity, but because the OPFOR plan had been reviewed by O/Cs from the NTC, it was felt that no changes were needed.

Likewise, the battalion staff training audience found the TSP materials useful. Their specific suggestions were mostly in the nature of improvements that could be made in the TSP. They also mentioned the same initial situation confusion that the brigade staff had pointed out. The battalion personnel who participated from SIMNET and the reconfigurable simulators had few substantive comments about the exercise materials, other than wishing for more information about the simulations and the purpose of the exercise as a research trial. This is information that should be provided in any future implementations of the exercise.

Personnel who role-played the division staff in the EXCON cell were very positive about their TSP materials. Two of them remarked that they would have wanted an additional copy of the Division OPORD as a reference, and one role-player thought that the scripted messages were

"somewhat skimpy" for fire support. Other BBS workstation personnel, representing the brigade assets, felt that their guides were complete and detailed, although some thought that the materials were somewhat unclear and difficult to navigate. The revised materials now contain more easily followed guidance, along with more detailed pointers to different component parts.

The SOCT and Warthog observers had mixed reactions. While they generally felt that the materials were a good reference, they also indicated that, as professional O/Cs, they really didn't need very much guidance. They did, as a group, feel that the guide was not very useful in describing how to obtain information on battlefield effects that were related to the performance and how to participate in White Cell meetings. The performance objectives guides were somewhat sparse on guidance for observing appropriate battlefield effects, on the assumption that the observers would be able to identify the appropriate times and places to observe. It is possible that this aspect of the performance guides should be more completely provided in future editions.

The Warthogs also noted that the observation materials were only an extract from the Mission Training Plan (MTP). This was, in fact, the case for observers of the maneuver companies, scouts, and logistics personnel (support platoon leader and 1SGs). This approach was based on that used in the VTP, where observations points for subordinate units are drawn directly from Army Training and Evaluation Program-MTPs and field manuals (FMs). Revising this approach may be a matter for future developers, in order to provide more useful observation tools for observers that are structured to correspond to exercise events. This will require some creativity: Events for the companies and other subordinate units are unpredictable, and are almost certain to be different among those units. Some Warthog observers also commented that they did not have a sufficient overview of the purpose of the exercise.

Staffing requirements. In general, members of the training audiences at all levels, as well as the unit-provided support participants, felt that the CPs and workstations were understaffed. They reported that the austere staffing plan had caused them to be less efficient and less effective than normal. Most of the O/C comments were in agreement, although one respondent indicated that the exercise required too many people. The materials should more clearly state that as many participants as the unit can bring to fill out the CP roles will be useful and will receive valuable training. The TSP contains only the minimum model.

Schedule and time allocations. Comments on the schedule and time allocations were of two kinds. Some focused on the amount of time that was spent in AARs, feeling that it cut into their training time. The actual training schedule did in fact contain more O/C-conducted coaching and feedback sessions than had been called for in the proposed schedule (Figure 12). These sessions were provided primarily for the brigade commander and his staff, to cover some of the techniques and procedures associated with reconnaissance and with rehearsals. Some of the brigade staff commented on the value of these sessions, but the bottom line was that more time was spent in brigade coaching and feedback sessions than had been intended.

At the battalion level and for the subordinate levels, fewer feedback sessions were held than had been scheduled. The Warthog O/C team preferred coaching sessions to formal AARs; the battalion staff did not comment, either favorably or negatively, about the time spent in AARs.

The other recurring comment from all participants was that they wished to receive their materials earlier so that they could review and study the contents. This is always the intent with structured training exercises, that the participants receive and study their guides, individually and

in groups, before the training is to begin. They also recommended that the planning and preparation phases could be done at home station during the weeks or months before coming to the exercise site. However, because the model for training stresses the importance of mentoring and feedback during all phases of the mission, an observer needs to be present as planning and preparation are done. A review of the brigade's finished order cannot capture the processes involved in the decision-making, nor provide enough information so that pointers and feedback can be given to the unit leaders.

Training model. The "training model" comments refer to the exercise scenario and the training process. At all levels, participants and O/Cs commented on the lack of CSS training. Although the exercise had been designed to incorporate significant requirements for CSS planning and action, events during the STOW-ET precluded the intense CSS activity envisioned. The fact that only one mission, with no follow-on mission, was conducted, and that two executions of the mission were conducted, meant that there was neither a pressing need nor time for CSS work in reconstitution, reorganization, consolidation, or sustainment.

There were a number of comments from brigade and battalion staff relating to the reconnaissance and surveillance (R&S) portion of the exercise. The participants were generally very much in favor of an emphasis on R&S, but expressed some concern about the process cued in the exercise and the techniques and procedures contained in the performance objective material. This perception is likely to continue for some time, as the Army continues to clarify and crystallize its doctrinal expectations concerning R&S.

The issue of whether or not mission planning should be included in the on-site portion of the exercise came up again, at the brigade level and also from the SOCT brigade observers. The concern is not that there should be no emphasis on planning, but that on-site simulation-supported training time would be better spent on execution. Again, this would allow planning to occur with no dynamically changing conditions to influence decisions, and no observation and feedback on the planning process.

Multiple suggestions were received concerning preparation for an exercise of this scope. They included receiving the materials earlier (already discussed); including more of the staff in preparation and in the training itself; providing more structured training for simulation operators (interactors); doing the planning at home-station; and including the VTP as a required preparation activity. EXCON members role-playing the division commented that the division order should be briefed by division role-players; this is in fact the model recommended for the BSE and BBSE, but would have been difficult to carry out in the STOW-ET because of the short lead time for EXCON members. Observers mentioned the fact that they too need time to prepare for their role in the exercise. One brigade observer commented that he would not have time to prepare for an exercise if he received the materials only a few days in advance. This is a valid observation with which developers concur. In fact, the Observer Guides were distributed over a week before the exercise was conducted, along with a walkthrough of preparation activities for the exercise.

Both training audience members and observers commented on the feedback session and AAR plans. Training audience members at brigade and battalion levels recommended that participants from other echelons be included in each echelon-targeted AAR. While this had been recommended in the TSP guides, observers were not always able to follow the suggested

schedule and attendance guidance. The brigade observers noted that they were able to follow their own standard AAR procedures, although they missed having simulation-generated AAR charts. They also commented that the exercises require "professional O/Cs."

The difficulty level of the exercise was the topic of several comments. At battalion level, the feeling was that the use of multiple warning orders for recon and the DATK made the exercise unnecessarily difficult. Role-players at EXCON recommended that the exercise include more than one scenario script for execution, so the unit could be challenged to adjust the plan in reaction to enemy activity. However, the observers at both brigade and battalion levels commented that the exercise was too difficult for a National Guard unit that is still at the "crawl or walk" stage of proficiency. These comments are not inconsistent. Creation of additional scenarios and associated materials would offer more choices to units, who could then select the exercise best suited to their own training needs.

There were also various views on whether or not there was enough activity to engage all members of the unit. Battalion training audience members noted lulls in the R&S activity, when other training could be conducted as the full exercise continues. Likewise, the battalion observers found that there was a great deal of down time for the tank and Bradley crews, because of the focus on the brigade and battalion staffs; the crewmembers themselves offered the same observations. The command sergeant major and the support platoon leader both lamented that they had no role in the exercise. This has been a concern for some time. In a real world situation, there is more than enough activity to keep all members of the brigade occupied, from the commander to the loaders and drivers. However, in the simulation world, real world requirements are minimized, including finding time to sleep.

At the same time, the training audience in the virtual simulators found that fatigue was a real problem when they were busy. Their first week in SIMNET on VTP platoon and company tables continued into a second week in the STOW exercise, with no recovery period. A number of participants observed that trying to execute the mission twice in one day was too demanding for all participants.

Brigade observers had several comments concerning exercise control. They recommended that there be closer and more frequent interaction among observers and controllers, as well as with the unit leaders, in order to ensure that the exercise goals are being met. They also noted the potential value of the White Cell in assisting in that interaction. Referring to their traditional role as exercise controllers and directors, the observers noted that the STOW-ET did not afford them the same level of control. In fact, the training model recommends a separate Exercise Director from the unit higher echelon, allowing the observers to focus on their mentoring, coaching, and feedback role.

Finally, there were several comments concerning the value of simulation in general, and the STOW-ET in particular, as tools for training. The company-level training audience noticed little difference in how they performed their duties when comparing the VTP and the STOW-ET. Battalion observers were generally positive about the use of the reconfigurable simulators, despite the shortcomings observed in this new technology. They were still skeptical about the utility of STOW, however, noting that it still has a great many technological flaws.

Discussion

The results reported here were further summarized, leading to the formulation of three general statements of findings, as described below.

Scenario and TSP development for STOW-type training posed few new challenges. The STOW-ET scenario and TSP were developed using methods that had been used successfully during previous related efforts. The methods are not unique to any particular simulation or training need, but are customized for every application. These methods worked quite satisfactorily for STOW scenario and TSP development. The comments of the training participants indicate that, in general, the materials were useful and correct. Their specific comments concerning greater use of samples and more specific and useful tools for company level observation should be attended to in future development. Comments about receiving the materials earlier, in time for preparation, have been incorporated into the Exercise Director's Guide and emphasized there.

The greatest development challenge was related to the STOW technology itself. Because technology is still under development (as discussed below), a variety of workaround solutions were generated to cope with weaker aspects of the simulation. For example, once tested and documented, these workarounds had to be included in the TSP materials so that role-players and interactors could perform them.

As the simulation technology matures, the workaround requirement should shrink and eventually vanish. The TSP for future STOW-type exercises will more closely resemble TSPs developed for related structured training programs.

Despite the novelty of the STOW architecture, the basic TSP structure and development method were easily adapted for the STOW-ET. Even though, as described earlier, some components of the TSP were not prepared for the trial, placeholders for those components were in place. This was not because the TSP model was inadequate, but rather because the trial served as the opportunity to determine what the actual content of those components should be.

The STOW-ET addressed a large training audience, but also required significant personnel support. Implementation of the STOW-ET required the efforts of 42nd ID (M), 3rd Bde, and TF 1-101. Approximately 255 people in the training audience and 43 more in support roles at simulation workstations participated, and even at that, training audience members felt that the exercise was understaffed. By contrast, the training audience for the BBSE is about 10 people, with a support requirement of 91 role-players and interactors.

It also required a host of support personnel. These included the COBRAS Team, FXXITP staff, CLS site personnel, and SOCT and Warthog observers. Estimates of total person hours required to support the exercise are difficult because much of the preparation was a developmental effort that involved proofing the scenario on the systems and preparing the TSPs. However, an estimate is that the actual running of the five day exercise required approximately 11,000 support hours (excluding any accounting for personnel who were designated as training audience) and that preparation for the exercise required between 3,000 and 4,000 person hours (excluding design and TSP preparation activities). Clearly, the conduct of such an exercise as the STOW-ET comes at a cost.

Part of the support requirement was caused by the developmental status of the STOW architecture: Extra controllers and operators worked to keep the scenario running when unexpected system failures occurred, so that the use of simulation would continue to be transparent to the unit. When the simulation weaknesses are overcome, this requirement will be reduced.

Another contributor to the personnel support burden was the fact that the participating unit was a National Guard unit, away from its home station. Roles that would normally be filled by division, a sister brigade, or the brigade's other battalions were instead assumed by COBRAS staff. These included the positions of Exercise Director during the planning and preparation for the exercise, COBRAS Coordinator, Blue Forces Controller, and OPFOR Controller. Additionally, nearly 40 SOCT and Warthog observers and controllers supported the exercise.

Clearly, STOW-type exercises open the way to integrating training for many more participants. Brigade members from the commander down to company members played their roles in the operation.

However, a STOW-type exercise simply has more control stations than either a SIMNET-only or a BBS-only exercise. Therefore, the controller need should still be expected to be higher than would be required for single-simulation exercises. The benefits of training for an expanded audience must be balanced against these resource costs.

The STOW-ET required unique training schedule considerations. Multiechelon training such as was provided in the STOW-ET brings together personnel from the platoon through division levels. However, the levels of activity for different echelons peak at different times during the course of a mission. As a result, platoons and companies in simulation would be essentially idle during the brigade's intense planning activities.

In order to keep the training activities at valuable levels throughout the training period for all personnel, planners of the STOW-ET devised a schedule that involved VTP training for platoon and company team personnel while the battalion and brigade were engaged in planning and preparation. This also allowed units in SIMNET and DRSs to become familiar with the operating requirements of the simulation environment.

The risk in this type of scheduling is in requiring soldiers to spend too much time in their virtual vehicles. Simulation fatigue at the end of the two weeks of virtual training was reported by many participants, and has also been reported in other efforts.

Implications

The following recommendations are based on the assumption that STOW technologies will continue to be developed, improved, and tried out with units. In order to conduct trials with units, TSPs and other training support will be needed. These recommendations lay out the fundamental and immediate requirements for continuing technology development support. They also address long term requirements, including additional evaluation of TSP components and personnel support infrastructures.

First of all, any future implementation of STOW training will require additional TSP work. The current version of the STOW TSP is only partially complete and will need additional materials before it can be used again. Specifically:

- It contains comprehensive tactical materials and unit preparation materials.
- Simulation files and documentation will require extensive reconstruction for future implementations. Already (in October 1998) the simulation is different from what it was in February 1998, at the beginning of this STOW trial. In general, the simulation archive files (the files that define starting conditions) are not upwardly compatible. Additionally, some of the simulation improvements will cause workarounds that were incorporated in the STOW-ET versions to be unnecessary.
- As the STOW and individual simulations are changed, instructions for role-players and interactors will require corresponding revisions. Those instructions were written for the existing version of the STOW technology.
- Materials for the exercise management require additional testing in a trial. The Exercise Director and OPFOR Controller guides were available for the trial, but were significantly expanded thereafter. Specific instructions for the STOW Coordinator (the Exercise Director's principal assistant) and the Blue Forces Controller must be incorporated in appropriate guides. These roles were carried out by COBRAS staff and written instructions were unnecessary for the trial. Thus, the effectiveness of the printed instructions has not yet been tested.

Preparation for the STOW-ET spanned a period of eight months for preparation of the exercise and the TSP. A period of at least four months should be allowed for making revisions and completing a TSP for another iteration.

Second, near term development should focus on single site (nonexportable) STOW training. The preliminary findings concerning the STOW exercise model, TSP, and technology status described above are applicable to the situation at Fort Knox. It would be premature to try to generalize the findings to any discussion of an exportable STOW exercise for use at other sites, because of the still experimental and developmental nature of the entire implementation and infrastructure model.

The most cost-effective near-term implementation model would specify a single STOW training site, located at Fort Knox. The model would include all of the specifications for site preparation and unit preparation, and units would rotate to Fort Knox-STOW just as they do to the VTP and to the CTCs. The infrastructure established for the STOW-ET would require certain upgrades, but the foundation is in place.

Within this model, however, the requirement for exercise controllers and unit observers is placed on Fort Knox. Unless units are able to fill control positions (e.g., Exercise Director, Blue Forces Controller) with fairly senior personnel from within their own resources, Fort Knox would staff the control roles. Because of the size of the training audience, the requirement for about 40 observers is unlikely to be reduced over time; these positions, too, must be staffed by Fort Knox.

Third, decision-makers must consider the personnel costs involved in STOW-type training. It is apparent that the conduct of an exercise such as the STOW-ET comes at a cost. It should be emphasized that *little of the support and preparation time was borne by the unit.* All training involves some expenditure of resources to support the training. While simulation-based training is generally cited as a way to save operational tempo (OPTEMPO), it also has its own

costs. Estimates of the cost of experimental exercises such as the STOW-ET must be balanced against the understanding that support for developmental trials is generally more demanding than support for later applications should be. It should also be balanced against the benefit to the unit, whose members were able to prepare for the exercise during regular weekend drills.

Finally, TSP developers need continued trials of the STOW. Assuming each trial using STOW technologies would test changes in technology capabilities, developers of exercises and TSPs would be able to collect data pertaining to training design and implementation models. This information is necessary for completion of the STOW TSP. Without these trials and a focused formative evaluation, TSP developers are relying solely on experience with other programs to modify the exercise design and support packages.

Operational Requirements

The goal of interfacing various computer technologies and locations is to provide for the training of a designated audience. To support training, the environment that includes the simulation and the linkage must meet the following requirements:

- Seamlessness: The information that the simulation presents to the trainee must be consistent with cues being received from other sources including other simulations. This must be done without imposing a requirement on simulator operators or other supporters to translate or interpret information.
- Realism: Simulation must provide cues that are consistently realistic. The training audience should not be working under constant awareness that they are operating in a synthetic or simulated environment.
- Efficiency: Training must be accomplished with a minimum of support requirements. Linkage must not involve demands for specialized training and one-of-a-kind expertise.
- Effectiveness: The simulation and linkage must directly support stated training objectives for a specified training audience. Further, the simulation and linkages should be necessary for fulfilling the objectives.

The Fort Knox STOW architecture is intended to support training that links all of the elements of the BCT. Before *training* can be accomplished, technical weaknesses that obstruct training must be fixed. The goal is not a perfect system, but, insofar as possible, training detractors must be eliminated. The efficacy of the Fort Knox STOW architecture as part of a training system will be more accurately gauged when certain technical concerns, described in this section, are resolved.

Appendix C contains "wish lists" compiled by various members of the COBRAS Team, Force XXI, and others who helped to implement the STOW-ET. These lists detail features that they still hope to find in STOW or in any simulation used in training.

Specific Results Concerning Operational Requirements

Items and comments on the questionnaires, as well as interview discussions, focused on five areas. The comments are presented in Appendix D, and each area is summarized separately below.

Simulations/Simulators. Comments concerning the simulators and simulations addressed the STOW environment, simulation in general, the reconfigurable simulators, and the ability to capture performance data from the simulation. There was general consensus that STOW has great potential, but is not yet ready for "prime time." Problems in allowing for engineer task performance, minefield and breaching portrayal, differences in the terrain databases, inconsistencies between what appeared in SIMNET and what was "ground truth," and technical difficulties with disaggregation were all noted. Although they caused some frustrations to participants in the STOW-ET, they are likely to be addressed in future upgrades to the technology.

Not all simulation-related problems could be traced to STOW. In some cases, BBS or SIMNET alone were judged to be insufficient in their ability to portray the battlefield conditions. Specifically mentioned were CSS activities (ordering Class III and Class IV), intelligence gathering, inability to use popped hatch in SIMNET tanks, difficulty in navigation in SIMNET because of the imperfect depth perception and limited vision, and the unrealistically complete BBS reports.

As mentioned earlier, participants were generally favorable about the reconfigurable simulators. While noting features that needed to be corrected, they still felt that the use of these simulators made it possible for CSS and scout platoon members to participate more fully than ever before.

The observers had several comments related to the capability of the simulation to support their observation and feedback function. Their greatest concern seemed to be the absence of a single "see-all" capability, which they could use to judge both the commander's view of the battlefield and the course of the unit's conduct of the mission. This is felt to be a pressing need for technology designers and developers.

Physical Layout. Most of the comments on the physical layout for the exercise concerned the size and close proximity of the CPs in the Mounted Warfare Test Bed (MWTB), and the distances between different simulation sites of MWTB, MWSTC, and Skidgel Hall. The brigade and battalion training audiences felt that the simulated CPs were too small, not laid out as they would usually be, and too close together. EXCON division role-players felt that the split between two buildings complicated their role, although they did feel that the use of visual links and whiteboards was helpful. Brigade and battalion observers were also frustrated by the distances between their locations, which made communications and coordination more difficult. The members of the Warthog team who controlled forces at ModSAF stations, as well as BBS workstation teams, pointed out the need for additional workstations to allow all users to be able to get at the controls as needed.

Communications. There were many comments concerning the communications systems. In particular, the networks and radios installed for unit communications were a source of frustration. Training audience members commented on the bleed over problems caused by the

large number of required nets, the insufficiency of the number of nets, and the lack of resemblance between the citizens band radios used and their own mobile subscriber equipment (MSE). Examination of some of the reported problems with radios simply not functioning revealed that in many cases the problem was operator error.

Observers reiterated those comments, pointing out that the exercise could provide more training value if the radio situation was upgraded. They also noted shortcomings in the control communications systems, which made the physical distance between sites more difficult to overcome.

Discussion

Further examination of the specific results and direct observations led to the formulation of five general categories of conclusions concerning operational requirements, discussed below.

Better translation between simulations is needed for weapon systems and CSS functions. Specific instances of the incomplete translation of weapon systems include:

- Only about 40% of the vehicles and weapon systems modeled in BBS can be translated correctly into ModSAF. Only about 50% of vehicles and weapons that are modeled in ModSAF translate correctly from ModSAF to SIMNET. Combat assets translate best, followed by CS, followed by CSS assets. In the STOW-ET, extensive workarounds were required to compensate for these technical weaknesses.
- Dismounted forces and their associated weapons do not translate at all from BBS into SIMNET. This particularly affected scouts and dismounted infantry, but also affected the ability to portray realistic Level I and Level II rear area threats.
- Aircraft modeling does not translate between simulations. Aircraft were flown independently in both ModSAF and BBS in order for all effects to be modeled. This was a complex and time-consuming requirement, and has the potential for introducing inconsistencies and confusion.
- Except for M109A6 high explosive rounds, no indirect fire artillery correctly translates from BBS all the way through to SIMNET. This results in all artillery effects looking the same; there is no way to distinguish among effects in terms of type, size or volume. This seriously affected reporting, battle damage assessment (BDA), and battle tracking. Additionally, none of the simulation systems allows forward observers to execute their roles in Copperhead missions, negating any training value of planning to employ these munitions in simulation.
- Engineer equipment such as earthmovers, armored vehicle launched bridges (AVLBs), and Volcanoes do not translate into SIMNET. The mine clearing line charge translates to SIMNET only as a trailer and provides no signature.

While BBS portrays CSS functions very well, very little of that translates to ModSAF and SIMNET. Specifically:

- Attempts to recover and repair ModSAF or SIMNET vehicles using BBS CSS capabilities were unsuccessful.

- Resupply in ModSAF and SIMNET can be done in the tailgate mode, but problems with controlling the vehicles made this function impractical to apply. Further problems arose because some units in BBS lose all their fuel and ammunition when disaggregating.
- No personnel losses occur in SIMNET, therefore the casualty tracking based on SIMNET data cannot correspond with BBS results. Personnel roll-up reports in BBS summed results incorrectly throughout the exercise.

CSS play is essential to the training design of the exercise conducted. Realistic CSS play is dependent on accurate and timely reports. When this could not be done because of system problems, the training audience expressed frustration and disillusion with their role in the exercise and much of the perception of training value from their participation evaporated. The inability to portray the full capabilities of transportation, CSS vehicles, and classes of supply resulted in the workaround requirement for "magic" resupply. When this happened, the logistics training audience ceased to have a significant role in the exercise.

Not all of these problems were caused by the STOW linkage. Some of them have existed for some time in BBS, ModSAF, or SIMNET. However, the training audience requires a single seamless environment. Making conceptual translations to compensate for technology weaknesses compromises the fidelity of the environment and the potential value of the exercise.

Desktop reconfigurable simulations enhanced scout participation, but improvements are still needed. Reconnaissance and utilization of scouts was confounded by many problems which affected the goal of training the BCT's R&S plan. Scouts in BBS can dismount but scouts on the DRS cannot. Even dismounted scouts in BBS lose all their small arms when they are disaggregated and modeled in the SIMNET environment. Scout vehicles must give up all .50 cal ammunition when disaggregated and modeled in SIMNET or else they cannot move, leaving them without any protection. Although involving the scout platoon may have provided valuable troop leading authenticity and teamwork, the DRSs did not fully portray or support the scout reconnaissance mission itself. Nonetheless, the scout participants were positive about being able to participate more fully than in other simulation-based training.

Environmental conditions should be portrayed in SIMNET. Shortcomings categorized as environmental conditions concern ambient conditions (weather and light) and ground conditions (ability to dig or mark). First, variable weather and light conditions can be entered in BBS but cannot be portrayed in ModSAF/SIMNET. As a result, all operations took place in daylight and in neutral or non-existent weather. This was unrealistic for planners and commanders as well as for crews. It obviated a vital part of the intelligence officer (S2) function and did not force planners to integrate this important facet into their plans. Similarly, smoke cannot be employed in SIMNET. This frustrated initiatives by planners to realistically employ this combat multiplier.

Second, no terrain modification is possible in SIMNET, eliminating portrayal of vital engineer functions. The exercise scenario called for a DATK, which should have involved maximum utilization of mobility, counter-mobility, and survivability assets and principles of engineer employment. Unfortunately, minefield signatures are non-existent; all minefields are perfectly hidden, denying the use of visible minefields for deception and canalizing. When minefields were reconnoitered and marked in BBS, this fact did not transfer to SIMNET, creating

confusion in execution and battle tracking. Lane marking in minefields was limited to a single SIMNET-specific portrayal which did not support the full array of doctrinal marking requirements.

Communications problems continue to frustrate training participants. A major part of the STOW-ET preparation was establishing and maintaining communications between the locations to replicate tactical nets and provide administrative links for the control of the exercise. These communication requirements exceeded anything already established at Fort Knox for existing training programs. Implementing and maintaining communications was a major effort of the exercise requiring a full-time person for several weeks.

Nonetheless, the system was not always optimally reliable. Some of this was undoubtedly due to user unfamiliarity with the communications systems, which were unlike their normal MSE radios. In other cases, the communications systems could not bear the heavy load of the number of users, resulting in frequent reports of channel bleed-over and instances of particular nets not being represented.

For staff training and CP operations, information transfer and communications links are vital. Yet the system, as currently installed, lacks capability for replicating data transmission, tactical facsimile, MSE links, computer links, phones, Joint Surveillance Target Attack Radar System (JSTARS) downloads, and data retrieval. A training environment that does not offer a greater semblance of realism in this arena will only be considered adequate for a short period of time. As the simulation system matures and offers more realism, the same will be demanded of the communications systems.

Physical locations of the CPs oversimplified unit communications. During the exercise, 3rd Bde's main CP and rear CP were separated only by a 6-foot partition, and the tactical command post (TAC CP) was located about 100 feet away. Similarly, the main CP and CTCP for TF 1-101 were directly next to each other, and the entire TF CP complex was about 50 feet from the 3rd Bde main and rear CP locations. This allowed for unrealistically easy face-to-face contact between persons at the different CPs.

When the siting was being done, this did not seem to present a problem, because traffic between CPs could be readily controlled. However, problems with the normal radio as the means of communications forced training participants to find other ways to pass messages and share information. It was very easy for participants to simply talk over partitions or walk around the corner, especially when they were unable to use their radios.

Physical locations of the simulations impeded observer and controller communications. At the same time, the physical separation among the simulation sites made communications among observers difficult. The BBS site is about a half-mile from the two SIMNET buildings, which are side-by-side. Because meetings among exercise control personnel were often impromptu, it was difficult to assemble all of the appropriate observers and simulation controllers to provide input on decisions affecting exercise pace and direction.

STOW does not fully support AAR functions. In exercises that focus on staff performance at brigade or battalion level, most of the observer information is collected from direct observation of the staff members. In lower echelon exercises, where most of the activity

occurs on the battlefield, and mostly during execution, a see-all workstation is essential for obtaining ground truth about events.

The STOW-ET, as a multiechelon exercise, required that observers be positioned to observe both the training audience performance and battlefield activity and effects. However, the AAR workstation in the SIMNET facility was not see-all: Only elements that had been translated to SIMNET or generated in ModSAF were visible to the observers. This meant that observers were unable to track the battle with any more precision than the training audience members whom they observed. Additionally, they were unable to show the aggregated forces during playbacks at the AARs.

The BBS workstation set aside for observer use, located at the BBS simulation site (about a half-mile from the building housing the 3rd Bde CPs), was see-all. However, playback capabilities in BBS do not include dynamic presentations of actions, but instead are screen captures at isolated points in time. Observers felt that AARs conducted using BBS playback were not sufficiently informative to justify the time.

Implications

The COBRAS-STOW was a unique opportunity to look at STOW technology in light of the training implications of using technology. As such, the exercise staff carefully identified areas during the nine-month preparation for the exercise and during the exercise itself that need addressing before the viability of STOW technology in its training role can be fully evaluated. No attempt was made to do an overall evaluation of the efficacy of STOW applied to training. The areas described above were identified as demanding attention before continued training applications of a STOW are used. It is recognized that not all of these areas are equally easy (or difficult) to fix; some may take a long-term, multi-phase approach to solutions. This evaluation is admittedly not even-handed; while more things went right with STOW than went wrong, it is of necessity that the evaluation concentrates on problems, not accomplishments.

It is apparent that continued trials of the STOW exercise will benefit STOW developers, and are in fact required for continued development. Developers of the STOW linkages and software rely on system tests to determine whether entities translate properly from one environment to another. Only by using the "soldier in the loop" can developers know whether the translations and representations are adequate. Some translations can be imperfect without affecting training value, while others are critical. Developers and subject matter experts make their best estimates of the critical elements, but will always require trials with representative training audiences to verify their estimates.

At the same time, it is apparent that STOW technology upgrades are needed in order to conduct additional STOW training. While it is understood that this is an ongoing process, it should be possible to effect significant software improvements prior to involving units in trials. Although testing the realism and utilization of features requires soldiers in the loop, enough data is available on improvement needs that the work and decision-making can be done without soldiers.

Upgrades to the separate simulations (BBS, SIMNET, ModSAF, and the reconfigurable simulators) would also greatly enhance the value of the exercises. The requirement for participants to make cognitive leaps in processing information is a distraction to training.

Despite the major accomplishments in providing communications links, this was still cited by participants as a shortcoming, both during and after the exercise. Any future replication of a STOW-type exercise at Fort Knox must include the requirement to improve the realism and reliability of communications.

The issue of relocating CPs to provide greater distances between them and to discourage inappropriate face-to-face contacts appears to be minor and easily addressed. Relocation of simulation systems to collocate the various control teams and observers is a much greater undertaking. Solutions that enhance control communications without requiring the movement of simulation systems must be explored first.

The degree to which the STOW technology can ever be perfected using the legacy systems of BBS and SIMNET is questionable. However, the indicators of likely areas of training benefit should be useful to developers of future systems, including WARSIM 2000 and Joint Simulations (JSIMS).

Training Value

One purpose of the STOW-ET was to evaluate the quality of training that could be conducted in this type of exercise. The trial was not designed to objectively evaluate the effects on specific training outcomes. Observations of the trial implementation and discussions with training audience members and observers were used to elicit perceptions of positive and negative aspects of the STOW-type exercise, identify ways in which the STOW exercise may add training opportunities, and also identify ways in which it does no more than duplicate the training found in existing programs.

Specific Results Concerning Training Value

Specific comments from the questionnaires and interviews are reported in Appendix E. The discussion here summarizes the comments and data. The summaries are reported separately for the three groups of respondents: brigade participants, TF 1-101 participants, and TF 1-101 subordinate unit members.

Brigade participants. The questionnaire items and response rates are shown in Table 2. The questionnaire asked two items pertaining to the effect of having one TF in virtual simulation. Although more than half the respondents reported that there were no effects, some respondents recognized differences in the frequency of reports, but no differences in how the reports influenced (positively) the brigade staff's picture of the battlefield. The comments indicate a perception that SIMNET, and not BBS, actually provides a more accurate picture of what is taking place on the battlefield. This is in fact erroneous: The picture presented to training audience members; in SIMNET is accurate, but is then filtered by perception, interpretation, and reporting skills. The picture in BBS is always reported perfectly in BBS reports, although the information may not be relayed perfectly.

Table 2

Brigade Staff Questionnaire Responses on Training Value

Question	N	Responses
Did the fact that one task force (TF) operated in virtual simulation, rather than from a Brigade/Battalion Battle Simulation (BBS) workstation, have any effects on your brigade staff activities during the execution phase of the deliberate attack (DATK)?	18	7 (39%) reported effects 11 (61%) reported no effects
Was your staff's image of the battlefield more or less clear, during the execution phase of the DATK, as a result of placing one TF in virtual simulation?	18	8 (44%) reported more clear 10 (66%) reported no difference
Did having one TF in virtual simulation cause your staff to have to deal with more or less uncertainty while trying to determine the friendly and enemy situations during the execution phase of the DATK?	17	5 (29%) reported more uncertainty 8 (47%) reported no difference 4 (24%) reported less uncertainty
Did having one TF in virtual simulation require you to do more or less analysis of the friendly and enemy situations during the execution phase of the DATK?	17	3 (18%) reported more analysis required 11 (65%) reported no difference 3 (18%) reported less analysis required.
Were the brigade staff activities (during the execution phase of the DATK) more or less realistic as a result of using virtual simulation for one TF?	17	2 (12%) reported less realistic 6 (36%) reported no difference 9 (53%) reported more realistic.
During the execution phase of the DATK, did you notice any differences in the reports coming from TF 1-101's staff as compared to the reports coming from the other two TF staffs?	17	11 (65%) reported a difference 6 (35%) reported no difference.
Number of times the reports were characterized as:		
More accurate		5
More timely		3
More informative		2
More frequent		1
Better format		1
More realistic		1
Was this exercise of more or less benefit to the brigade command group and staff than it would have been had TF 1-101 and the brigade commander operated from BBS workstations (if no virtual simulation had been used)?	17	2 (12%) reported less benefit 3 (18%) reported no difference 12 (70%) reported more benefit

When asked whether having a TF in virtual simulation affected uncertainty or clarity of their image of the battlefield, slightly over half of the respondents reported that there was little or no effect. One respondent suggested that the TF commander's presence in a tank simulator might have enhanced staff's image of battlefield. Other comments indicated that the brigade staff's handling of the TF in virtual simulation was more realistic and more difficult. The frequency of reports was mentioned again. There was some suggestion that, because reports from the virtual simulation TF were more frequent, the brigade staff felt that they had a clearer picture of the battlefield. However, none of the data collected can support or refute this perception.

Brigade participants were also asked about the execution phase of the exercise, and whether having a TF in virtual simulation affected their understanding of the enemy situation, the amount of analysis required, or realism. While few respondents reported any greater uncertainty or greater amount of analysis required, slightly over half said that the exercise execution was more realistic with a participating TF.

When questioned about the frequency and quality of reports from the TFs during execution, brigade participants generally indicated that the reports from the TF in virtual simulation were more accurate, timely, and informative. This response is consistent with their perceptions of increased realism. However, it should be remembered that only the SIMNET TF had a real battalion staff, with staff section members, as well as the actual subordinate unit members. The other two TFs were portrayed in constructive simulation by persons drawn from across the 42nd ID (M) assets -- not intact battalion staffs, and minus staff sections, companies, and platoons. So in the end, it may be the presence of the real TF staff and the type of input that staff got from their subordinate units that made the difference for the brigade staff.

The brigade commander was asked about how using a simulator affected his activities. His response was temperate: he stated that it is an important feature, that commanders should use their vehicle to get a feel for the terrain. However, he also indicated that he felt he had not taken enough advantage of the opportunity to "see" the battlefield.

The final question to brigade participants concerned the overall training benefit compared to a constructive simulation exercise. Here 70% indicated that there was more training benefit; only 2 (12%) said there was less benefit. Several cited the increased amount of crosstalk and reporting, which would argue for multiechelon exercises but not necessarily for the inclusion of virtual simulation. However, a number of comments were favorable regarding the ability to see the terrain, which is not possible in constructive simulation.

TF 1-101 participants. The questionnaire items and response rates for battalion staff participants from TF 1-101, which used the virtual simulation, are shown in Table 3. Participants were asked about the quality of reports from their companies, and were asked to compare the planning and preparation phase (when the companies were role-played by workstation teams in BBS) to the execution phase (when the company members were in SIMNET). None of the comments indicated that the respondents understood the question. However, they did report that they detected a difference – one comment attributed it to continuously improving performance throughout the course of the exercise.

Table 3

Task Force Staff Questionnaire Responses on Training Value

Question	N	Responses
Did you notice any differences in your company's reports during the brigade's execution phase versus the plan and prepare phases?	11	9 (82%) reported a difference 2 (18%) reported no difference
Did you ever have to interact with the brigade's other TFs?	11	7 (64%) reported contact with other TFs 4 (36%) reported no interaction

Over half of the TF respondents reported that there were benefits to having the other TFs portrayed, although a few pointed out that putting them in constructive simulation rather than in SIMNET may have mitigated the positive effects.

According to the TF respondents, the fog of war was portrayed adequately at TF level. This increased realism added to the perceived value of the training. However, the brigade staff indicated that TF 1-101's reporting was better. This suggests that the realism for the brigade staff is not created by inconsistent and inaccurate reporting, but by a simple increase in the number of reports that come up and the amount of information those reports contain.

TF 1-101 subordinate unit members. Questionnaire items and response rates for the training audience in TF 1-101 subordinate units are shown in Table 4. They were asked about differences between the previous week's SIMNET exercise (without brigade participation) and their experience in the STOW exercise, and how having the brigade involved affected their training. Some of the respondents said their roles differed and that there was training benefit from having the brigade there, but the comments were not overwhelmingly positive.

Table 4

Subordinate Unit Questionnaire Responses on Training Value

Question	N	Responses
Do you believe that the inclusion of the rest of the brigade, including the brigade commander and staff, made for a more intense or realistic training experience for your unit?	17	7 (41%) reported more intense training 10 (59%) reported no difference.
Did your unit (company or platoon) have any contact with the brigade's other TFs? If so, did having to be aware of the other TFs' presence increase the value of your training experience?	17	5 (29%) said yes to both items. 12 (71%) said no to the first item and did not respond to the second item.

There may be some slight perceived value at the company-level; reports of benefits are somewhat less positive because of the time the virtual TF spent waiting on the actions of the other parts of the brigade. However, both 1SGs and scouts, who often do not have a role in simulation-based exercises, were consistently positive about the training and their level of participation (Table 5).

Table 5

Virtual Simulation Crewmember Questionnaire Responses on Training Value

Were there features of the STOW exercise that made it more intense and realistic than other exercises?	50	17 (34%) reported differences 33 (66%) reported no differences

To what extent were the company, battalion, and brigade exercises valuable to you?

	Not at all	Slight Extent	Moderate Extent	Great Extent	Very Great Extent
Company Level Exercises	0	1 (2%)	5 (10%)	30 (60%)	14 (28%)
Battalion Level Exercise	2 (4%)	3 (6%)	13 (26%)	23 (46%)	9 (18%)
Brigade Level Exercise	5 (10%)	8 (16%)	11 (22%)	22 (44%)	4 (8%)

Discussion

The training value of STOW-type exercises has by no means been definitively researched. Three statements of findings, based on the observations during the trials and the results reported here, are described below.

STOW-ET participants reported satisfaction with the STOW environment as a training environment. Support for use of STOW-type exercises for multiechelon training was common throughout the training audience. In interviews and on surveys, the platoon, company, and scout participants candidly reported their difficulties with the communications and simulation, yet expressed positive reactions to the idea of multiechelon simulation-based training. The brigade and battalion leaders and staff members reflected that satisfaction, indicating that their subordinates found the training exciting, interesting, and valuable.

There were numerous comments on the value of including staff sections and other direct subordinates in the exercise, and some company and battalion leaders valued being able to participate with the higher echelon units. However, brigade and battalion leaders did not point out instances where they found that including subordinate units was of any significant value in their own training.

During several discussions and interviews, however, the brigade commander and staff speculated on use of a STOW-type exercise (or any multiechelon exercise) for the brigade. They maintained their enthusiasm and support for the training throughout the week at Fort Knox and during the months that followed. During his address to the Armor Trainer Update at Fort Knox in June 1998, the commander reinforced his initial reactions to the exercise. He commented that everybody from the brigade commander down to the tank commanders thought they were the primary training audience. Such reaction is rare in multiechelon exercises.

The commander further observed that having soldiers in the loop, that is actually maneuvering and operating simulated tanks and other systems on the battlefield, caused him to approach command and control much more realistically than is done in most constructive simulation exercises. He had to issue orders and make decisions knowing that crews, rather than simulation icons, would have to interpret, react to and carry out those instructions. Orders had to be clearer and allow for the uncertainties found on even a virtual battlefield, but which don't exist on constructive simulation screens.

The increase in realism caused by having soldiers maneuvering and operating on the battlefield gave him a better appreciation for time and space considerations of controlling the battle. His decision cycle had to include troop leading time and reaction time for subordinates to implement changes, and account for more realistic time and space issues. He found that moving forces in virtual simulation, while still not the same as maneuvering on the actual terrain, was much more demanding and realistic than what is found in constructive simulation exercises or purely command post exercises.

It is not possible to separate general satisfaction, a result of being included in a high intensity experience, from anticipation of specific training value. The commander's wish to incorporate the training in his annual training activities speaks strongly to the training value of the exercise. While this does not lead to definitive conclusions regarding use of STOW-type exercises in a full unit training strategy, it does suggest that such conclusions may be drawn in future studies.

The STOW-ET demonstrated the potential for significant training value in particular areas. The implementation conditions, with the workarounds attendant on an atypical training audience and an emerging technology, precluded rigorous testing of the question of specific training value opportunities. However, insights gained from the STOW-ET include the identification of training opportunities that are not addressed in other simulation-based exercises. The seven areas described below, if explored and developed in a STOW-based exercise, may provide capabilities that improve the quality of brigade and battalion training. Appendix F contains a list of the research questions that could be used in exploring these specific training value areas.

- *Battle Damage Assessment (BDA):* Assessing the effects of action on the enemy is essential to painting an accurate picture of the enemy composition and capabilities. Observation, confirmation, reporting, recording, and consolidation start at the crew level and are applied throughout brigade. BDA must be reported to and recorded by the staff after each direct fire encounter with the enemy, and is also required as part of every indirect fire mission and air strike. In SIMNET, soldiers can maneuver on the battlefield and report battle damage as they see it, a capability that makes BDA a realistic training opportunity. While BDA capability exists in BBS, the requirement to obtain BDA from forces on the ground versus reading it off a screen should enhance the requirement for all levels.
- *Indirect Fire Support:* Fire support (and air support) are dependent on ground observers. The ground observer provides details and control that let the brigade fire support officer prioritize fires and react to a changing tactical situation. Observed fire allows adjustment of that fire for greater effect, including repeat missions, to ensure

targets are neutralized. Observed fire also minimizes indirect fire fratricides because the observer should know the friendly force locations. The ability to coordinate control of fires down to the lowest level should provide a more realistic training experience.

- *Commander's Reconnaissance:* The commander, as the most experienced and best qualified person in the brigade, needs to get a "feel" for the battlefield during the planning process. The results of the commander's reconnaissance should be reflected in his initial guidance and in his course of action selection. This reconnaissance should take place early, very soon after the order is received. Properly conducted and integrated, it becomes an important factor in the military decision-making process (MDMP). In BBS based exercises, the commander cannot access the virtual ground that he must fight on. Selected members of the staff such as the operations officer (S3) and S2 should reconnoiter as well, time and resources permitting. A commander may follow up with more specific personal reconnaissance at subsequent points in the planning process, often including subordinate commanders or selected staff. The reconfigurable simulator and STOW links permit the commander and others to conduct reconnaissance several times during the planning phase.
- *Command and Control:* During crucial parts of the engagement or mission, the commander physically locates where he can best assess and influence the conduct of the battle. This will often be co-located with the main TF commander or on a piece of key terrain overlooking the action. The reconfigurable simulator and virtual links allow the brigade commander to position himself and to see what key units, and the enemy, are doing on the ground. This ability, which does not exist in BBS, allows for more realistic interaction of the brigade commander with his subordinate commanders and places a more realistic requirement on the staffs in integrating command and control into their battle tracking.
- *Full Dress Rehearsals:* FM 71-3 (DA, 1996) describes the full dress rehearsal as "involving up to every soldier and system taking part in the operation." The conditions of the rehearsal are that it involves, as much as possible, the actual systems, people, terrain, weather, light conditions as the actual operation. Full dress rehearsals should include the brigade commander in his vehicle and located where he plans or needs to be on the battlefield, and the staff in their CPs with all communications operational and utilized. Full dress rehearsals may be "special rehearsals," limited to key points in the mission, such as the breach. Virtual and reconfigurable simulator links allow somewhat realistic full dress rehearsals. At the very minimum, they should go down to company commander level. Platoon leader level is preferred.
- *Battle Monitoring:* During crucial parts of the mission, such as the counter-reconnaissance fight or the execution of the breech, it is often very difficult for the brigade staff to get an accurate picture of what is occurring from reports they receive through the TF CPs. One technique is to place a brigade radio on the subordinate unit command frequency (TF or even team) and directly monitor the action. In the virtual environment, frequent "real" message traffic will be generated by soldiers in the

simulators. If existing communications deficiencies can be overcome, this could provide an opportunity for more realistic situational awareness.

- *Reconnaissance Tracking:* The brigade issues a reconnaissance order to the TF to meet certain brigade priority intelligence requirements (PIR). The TF usually must implement these PIR through its scout platoon, sometimes augmented by other assets. The brigade must monitor the reconnaissance effort to ensure that the assets are in place, operational, replaced if lost, and that the PIR is answered or otherwise resolved. The brigade and TF both make continual modifications in the requirements or in the assets as the situation changes. The virtual environment allows the reconnaissance plan to be "played-out real time" and to be affected by "real" events such as enemy interdiction of assets, assets getting lost, or assets not observing the PIR. Real life adjustments must then be made. PIR should be realistically addressed in virtual environments (i.e., the scout sees what he actually sees on the ground; reports it; the information is analyzed and reported on up the chain; and questions or instructions are passed back down the chain to the scout). The linkage of SIMNET crews on the ground with the TF staff, up through to brigade, allows this information flow to occur.
- *Land Management:* The coordination of space and time on actual terrain is a problem in brigade operations. This is an S3 responsibility, but involves coordination with all CS and CSS assets assigned to, supporting, or operating in the brigade area of operations. Restricted terrain highlights land management problems, but they can also occur when graphics are carelessly plotted or constructed without regard to actual mission, enemy, terrain, troops, and time available. Land management also becomes a vital issue when timing between movements of maneuver units is not carefully specified in the OPORD, rehearsed, and coordinated by brigade in execution. It is a problem often not faced in constructive simulation because space (terrain) conflicts are not real. However, with a TF maneuvering on the virtual terrain, these problems may surface, depending on how realistically CS and combat services support resources are portrayed in the virtual realm.

The STOW-ET duplicated some aspects of existing simulation-based training programs. The STOW exercise was constructed as a hybrid of the VTP, the COBRAS BSE, and the COBRAS BBSE, and thus duplicates many features of those existing training programs.

- Like the VTP, it integrates activities of the support platoon and scout platoon in addition to the maneuver battalions, and places training audience members in a virtual environment. It also takes from the TSP for the VTP most of the SIMNET and ModSAF control guidance.
- It shares with the BSE a deliberate focus on the MDMP, as well as the tactical scenario for the DATK.
- As with the BBSE, the primary focus is on the brigade and battalion activities and interactions during planning, preparation, execution, and consolidation and reorganization.

The main difference between the VTP, BSE, and BBSE programs as compared to the STOW-ET, is that the STOW-ET allows platoon through brigade staff audiences to train

simultaneously. However, the question remains: Is there an advantage to multiechelon (platoon through brigade), simulation-based training? Addressing that question would require a fairly rigorous experimental design, with numerous experimental groups, reliable and valid performance criteria and means for measuring them, and control of a great many extraneous variables.

Because it was a trial of both the technology and the TSP requirements, the STOW-ET could not be considered to be the appropriate laboratory for true training value assessment. Instead, measure of participant perceptions of value and perceptions of exercise utility in a training calendar give some indications of potential value.

Implications

Despite the lack of empirical data to measure training value, it seems that use of STOW exercises is likely to be of benefit to units. This claim is deliberately temperate. Certainly none of the data from the STOW-ET suggest that the exercise is of lesser training value than the VTP, COBRAS BSE or COBRAS BBSE. Unit personnel from TF 1-101 and 3rd Bde, 42nd ID (M) were, in general, very positive about their training experience in the STOW-ET.

However, all of the existing scenario and TSP contents are predicated on a Fort Knox implementation, with the Fort Knox infrastructure and facilities layout. As a result, any unit using the STOW exercise would necessarily be away from home station, as was 3rd Bde.

Because the unit would be away from its normal resources, and because of the developmental nature of the exercise, implementations in the near future would again require intensive support from Fort Knox, as did the STOW-ET. Such support would likely involve the FXXITP, the SOCT and Warthog teams, CLS staffs, and COBRAS developers. During these implementations, much information could be obtained about the implementation model, while at the same time providing the best possible exercises to participating units.

It is certainly true that continued use of STOW exercises is needed for any assessment of training value to be conducted. A formal assessment of training value would enable researchers to determine the ways in which linked simulation-based exercises benefit users. Benefits must be examined for different types of tasks as well as for different segments of the candidate training audience.

Use of the STOW exercise, even under experimental conditions, is likely to be perceived by units as a good use of their training resources. If they continue to sign up for using the exercise, it will be possible to evaluate and improve the technology and the TSP. If the technology and TSP continue to improve, it should be possible within the next year to conduct a formal training value assessment.

Future Research and Development

The preliminary findings concerning the STOW exercise model, TSP, and technology status described above are applicable to the situation at Fort Knox. It would be premature to try to generalize the findings to any discussion of an exportable STOW exercise for use at other sites, because of the still experimental and developmental nature of the entire implementation and infrastructure model.

A logical near-term implementation model that would be supportable would include a single STOW training site at Fort Knox. The model would include all of the specifications for site preparation and unit preparation, and units would rotate to Fort Knox-STOW just as they do to the VTP and to the CTCs. The infrastructure established for the STOW-ET would require certain upgrades, but the foundation is in place.

Within this model, the requirement for exercise controllers and unit observers is placed on Fort Knox. Unless units are able to fill control positions with fairly senior personnel from within their own resources, Fort Knox would staff the control roles. Because of the size of the training audience, the observer requirement of about 40 persons is unlikely to be reduced over time; these positions, too, should be staffed by Fort Knox.

This conclusion must be considered in conjunction with further training value experiments and discussions. While it seems possible to create a STOW training model and system, further research is required to determine what the model will look like and whether it provides sufficient training value to justify the cost. Unless further trials are conducted to upgrade the technology and TSP, assessment of training value will not be possible.

All training involves some expenditure of resources to support the training. While simulation-based training is generally cited as a way to save OPTEMPO, it also has its own costs. Estimates of the cost of an experimental exercise such as that used in STOW-ET must be balanced against the understanding that support for developmental trials is generally more demanding than later applications should be. Nonetheless, the requirements of the STOW-ET provide a baseline by which to judge future replications.

A single trial of such an exercise, where the technology and corresponding support components are in place just in time for the exercise, is inadequate for drawing valid conclusions about training value, support requirements, or technology needs. A series of such trials, each building on the previous, is needed to provide insights into the potential value and cost of such exercises.

To enter into such a series of trials requires an assessment that the potential for training value in linked simulation-based exercises exists, and that potential is likely to be worth the costs associated with both the trials and the eventual implementation. It is the considered opinion of the evaluation team, based on the STOW-ET, that such potential exists.

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Appendix A.
Acronyms and Abbreviations

1SG	first sergeant
A/L	administrative/logistics
AAR	after action review
AC	active component
ACTD	Advanced Concept Technology Demonstration
AD	area defense
ADA	air defense artillery
ADCOORD	air defense coordinator
AIRNET	air network
ALOC	administrative/logistics operation center
APICM	anti-personnel improved conventional munition
ARI	U.S. Army Research Institute for the Behavioral and Social Sciences
ARM	anti-radiation missiles
ARNG	U.S. Army National Guard
ARPA	Advanced Research Projects Agency
ARSI	ARPA Reconfigurable Simulator Initiative
ARTEP	Army Training and Evaluation Program
ARTY	artillery
AT	annual training
ATT	anti-tank team
AVLB	armored vehicle launched bridge
AXP	ambulance exchange point
AZ	azimuth
BBS	Brigade/Battalion Battle Simulation
BBSE	Brigade and Battalion Staff Exercise
BCBST	battle command battle staff training
BCS	brigade clearing station
BCT	brigade combat team
BCTP	Battle Command Training Program
BDA	battle damage assessment
Bde	brigade
BFV	Bradley Fighting Vehicle
BIDS	Biological Identification and Detection System
BINO	binocular
Bldg	building
BLUFOR	blue forces
BMP	(Bronevaya Maschina Piekhota) Russian amphibious armored infantry combat Vehicle

Bn	battalion
BOS	battlefield operating system
BRDM	(Bronevaya Razvedyvatelnaya Dozornaya Maschina) Soviet amphibious armored reconnaissance scout vehicle
BSA	brigade support area
BSE	Brigade Staff Exercise
C^2	command and control
cal	caliber
CAR	combined arms reserve
CB	citizens band
CBS	corps battle simulation
CBT	combat
CCS	command and control systems
CCTT	close combat tactical trainer
Cdr	commander
CGO	cargo
CHEMO	chemical officer
CL	class
CLS	contractor logistics support
Cmd	command
Co	company
COA	course of action
COBRAS	Combined Arms Operations at Brigade Level, Realistically Achieved Through Simulation
COL	colonel
COSCOM	corps support command
CP	command post
CPX	command post exercise
CS	combat support
CSB	common sensor boundary
CSH	combat support hospital
CSM	command sergeant major
CSS	combat service support
CTC	Combat Training Center
CTCP	combat trains command post
CVS	combat vehicle simulator
DA	Department of Army
DATK	deliberate attack
DDMP	deliberate decision-making process
DIS	distributed interactive simulation
DISAG	disaggregated
DISCOM	division support command
Div	division

DOD	Department of Defense
DPICM	dual purpose improved conventional munition
DMP	decision-making process
DRS	Desktop Reconfigurable Simulator
DS	direct support
DTDD	Directorate of Training and Doctrine Development
ECOA	enemy course of action
ENG	engineer
EPW	enemy prisoner of war
EW	electronic warfare
EWI	early warning information
EXCON	exercise control
FA	field artillery
FASCAM	family of scatterable mines
FAX	facsimile
FDC	fire direction center
FIST	fire support team
FIST-V	fire support team vehicle
FLE	forward logistics element
FM	Field Manual, frequency modulation
FRAGO	fragmentary order
FS	fire support
FSB	forward support battalion
FSCATT	Fire Support Combined Arms Tactical Trainer
FSCM	fire support coordinating measures
FSCOORD	fire support coordinator
FSE	fire support element
FSO	fire support officer
FTX	field training exercise
FXXITP	Force XXI Training Program
G2	assistant chief of staff, intelligence
G3	assistant chief of staff, operations
G4	assistant chief of staff, logistics
GPS	global positioning system
GS	general support
HC	hexachloroethane
HE	high explosive
HEMTT	heavy expanded mobile tactical truck
HICON	higher control
HLA	high level architecture
HMMWV	high mobility multipurpose wheeled vehicle

HQ	headquarters
HUMRRO	Human Resource Research Organization
ID (M)	infantry division (mechanized)
IDT	inactive duty for training
IFSAS	initial fire support automation system
IFV	infantry fighting vehicle
INTSUM	intelligence summary
IPB	intelligence preparation of the battlefield
ISP	initial situation package
JSIMS	joint simulations
JSTARS	Joint Surveillance Target Attack Radar System
JTC	Joint Training Confederation
LAA	Legacy Application Adapter
LD	line of departure
Ldr	leader
LOGPAC	logistics package
M	mechanized
M/S	mobility/survivability
MANPADS	man-portable air defense
MDMP	military decision-making process
MEL	mission event list
MG	machine gun
MICLIC	mine clearing line charge
MLRS	multiple launch rocket system
ModSAF	Modular Semi-Automated Forces
MOPP	mission-oriented protective posture
MP	military police
MRB	motorized rifle battalion
MSE	mobile subscriber equipment
MTC	movement to contact
MTOE	modified table of organization and equipment
MTP	Mission Training Plan
MWSTC	Mounted Warfare Simulation Training Center
MWTB	Mounted Warfare Test Bed
NBC	nuclear, biological, chemical
NCO	noncommissioned officer
NG	National Guard
NSC	National Simulation Center
NTC	National Training Center

O/C	observer/controller
O&I	operations and intelligence
OCWS	observer/controller workstation
OPFOR	opposing forces
OPORD	operation order
OPS	operations
OPSIN	Operational State Interpreter
OPSTATE	operational state
OPTEMPO	operational tempo
PAM	pamphlet
PCI	pre-combat inspection
PIR	priority intelligence requirements
PL	platoon leader
Plt	platoon
POL	passage of lines
PSG	platoon sergeant
PVD	plan view display
R&S	reconnaissance and surveillance
RC	reserve component
RCVS	Reconfigurable Combat Vehicle Simulator
RECCE	reconnaissance
Recon	reconnaissance
ROM	refuel on the move
RSTA	reconnaissance, surveillance, target acquisition
RTD	return to duty
S1	adjutant
S2	intelligence officer
S3	operations officer
S4	supply officer
SGM	sergeant major
Sgt	sergeant
SIMNET	Simulation Networking
SIMNET-D	SIMNET - Developmental
SIMNET-T	SIMNET - Training
SITREP	situation report
SOCT	Senior Observer/Controller Team
SOI	signal operating instructions
SOO	support operations officer
SOP	standing operating procedures
Spt	support
STARTEX	start of exercise
STOW	Synthetic Theater of War

STOW-A	STOW Architecture
STOW-E	STOW-Europe
STOW-ET	STOW Exercise Trial
STOWEX	STOW Exercise
STRICOM	Simulation Training and Instrumentation Command
TAC	tactical command post
TAC CP	tactical command post
TACNET	tactical network
TACFAX	tactical facsimile
TC	tank commander
TECH	technical
TF	task force
TGT	target
THP	take home package
TM	team
TOC	tactical operations center
TOE	table of organization and equipment
TRADOC	Training and Doctrine Command
TSP	training support package
TV	television
U.S.	United States
UAV	unmanned aerial vehicle
USAARMC	United States Army Armor Center
VTC	video tele-conference
VTP	Virtual Training Program
WARNO	warning order
WARSIM	Warfighters' Simulation
WP	white phosphorus
XCIAU	Translator Cell Interface Adapter Unit
XO	executive officer

Appendix B.
Participant Comments Concerning Training Support

PART 1. TRAINING SUPPORT PACKAGE

Brigade Staff Comments

General comments

- Clear, concise, informative, useful tool.
- The guide was an excellent informational guide.
- Good overall information.
- Was very helpful; allowed clear guidance in tasks to be accomplished.
- I liked the outline of the MDMP and the sample R&S order (especially the fires paragraph).
- The sample R&S plan was a very good job aid for writing fires paragraph for the R&S plan.

Specific comments

- Probably should be linked to decision-making cycle more explicitly.
- Needed more graphics, more examples, and less text.

PART 1. TRAINING SUPPORT PACKAGE (continued)

Brigade Staff Comments (continued)

- STARTEX data should have been broken down by company. TF organizing requires the information at the company level.
- More information on the division concept of the counterfire and deep battle would help FSCOORD determine availability of assets from higher to assist bde.
- Could have given specific examples (e.g., course of action [COA] sketches, COA paragraphs, briefing formats, & presentation tips).
- Would like a sample brigade order with new doctrinal samples of annexes/verbiage.
- Incorrect modified table of organization and equipment (MTOE) numbers; corrected as we went along; constant verification of numbers.
- Enemy situation and layout may not have been realistic.
- [We] did not have a problem with the Annex B or the INTSUM, except that it led to some wrong conclusions. The Intelligence was accurate, but the COAs were not as detailed as [we] were used to.
- Enemy was "non-doctrinal" in its template, terrain chosen to defend, and it was isolated from other enemy forces. Led to concerns about planning both R&S and the DATK FSCOORD.

TF 1-101 Staff Comments

General comments

- Well presented, excellent information. It provided a preview to tasks, conditions, and standards. It was compact enough so that I could carry it with me and refer to it as needed. Should be required reading; those that read it really benefit twice as much.
- The exercise guide was excellent. It captured 4 or 5 manuals that I would normally refer to in a small, usable package. I used this most during the MDMP and order writing process.
- It put together information into a nice compact package combining things from more cumbersome manuals (FM 101-5).

Specific comments

- Should reference on the page where information was gotten from so that one could explore the level of detail above. This crosscheck would allow for fast referencing.
- In the signal operating instructions (SOI), there needs to be included call sign for Command Sergeant Major (CSM)/Sergeant Major (SGM) and also coordination role/play for the CSM.
- Do not need to rewrite the FM, or present their contents in a different format. Detailed techniques might assist their discussion and provide something more concrete to compare their current techniques and procedures too.
- Conflicts in task organization; we had a great difficulty in realigning the TF since BBS or SIMNET had us with a 4th Armor Co instead of a Mech Co.

PART 1. TRAINING SUPPORT PACKAGE (continued)

TF 1-101 Subordinate Unit (Virtual Simulation) Comments

General comments

- It is an efficient consolidation of training standards applicable to the exercise.

Specific comments

- Drawbacks of DRS (lack of depth perception, poor graphics, etc.) were not discussed.
- We really did not understand how we fit into the STOWEX. It would have been nice to have had a separate orientation for the battalion (bn) explaining our roles.

EXCON Workstation Team Comments

General

- [Guide] Gives good overview and responsibilities as a role-player, also understanding of the scenario.
- Provided pertinent information as to specific responses for FA missions.
- EXCON guide pointed out all responsibilities well.
- Script was prepared very well.
- The EXCON role-player guide, reference was very helpful, in distributing out many reports to the bde.
- Ref guide, was well written to respond to EXCON scenario actions.

Specific comments

- Would have liked to have had the Division OPORD included.
- [Having only] one copy of the OPORD hindered the cell, since 3 other personnel required to read in a short time frame.
- The script provided was overall adequate, but somewhat skimpy as far as fire support.

Brigade Workstation Team (Constructive Simulation) Comments

General comments

- I think the guide was just an excellent package to work with. There is not a thing to dislike.
- The guide made it clear as to what was expected of me.
- Provided an overview of the tactical situation. Provided a general description of duties in work cell.
- Explain in details the different function/control to follow to do my job. Also provided steps to fulfill my functions as CSS.
- The guide clearly defined what was expected of you in terms of the products you had to produce for the exercise.

PART 1. TRAINING SUPPORT PACKAGE (continued)

Brigade Workstation Team (Constructive Simulation) Comments (continued)

- Specific sections were detailed enough to extract from book and utilize during exercise.
- Easy and quick to find answers to questions and moves for the game.
- It provided updated information on how to use the system and when to use it. The TF books were very helpful because it provided you with current U.S. information and forms which we currently use.
- Each event and task was broken down very well. The sequencing of tasks set up in a very logical manner and made adapting to a situation much easier.
- Operational state (OPSTATE) tables were excellent. Prep checklist fantastic. Good overview and summary information.
- The separate binders for each terminal (combat [CBT], CSS, CS) were extremely helpful.

Specific comments

- The guide was unclear at times and it was time consuming to review when you had a problem that needed immediate attention in the heat of the battle.
- Needed better logistics reporting tips and roll-ups.
- FM doctrine and U.S. equipment data books, maps acetate and mirrors, and data maps should be required.
- You need to configure the table of organization and equipment (TOE) to that of the unit playing.
- The whole concept of SIMNET and BBS is very difficult to comprehend. It should be thoroughly explained to BBS people (the whole concept), i.e., role-player, BBS station. It seemed that we were playing the game vs. the role.
- The materials lacked substance. However, the rehearsals and wargaming improved how I perceived the battle and the integration of fire support.
- The exercise scenario we did the first or second day lacked sufficient supporting materials to make it even moderately realistic -- one sheet of paper doesn't cut it. Again, we didn't team guide - I used the tech support people.
- The interactor guide was very difficult to follow during the operation.

Brigade Observer (SOCT) Comments

General comments

- The packet provides good information, however, as an experienced O/C, it didn't provide any additional information that I didn't know or could use. The overall guide is a good base document providing good information for a non-experienced O/C to do his job.
- As a veteran O/C it was little value added. However, for a non-professional group of O/Cs, it would serve as a guide and save time that might otherwise need to be spent reviewing existing publications. Good guide! Having no checklists is good/correct.

PART 1. TRAINING SUPPORT PACKAGE (continued)

Brigade Observer (SOCT) Comments (continued)

- It served as a good reference handbook for the MDMP. Good outline (overview) of observer mission, exercise objectives, enemy and friendly situation.
- Entirely too vague and non-specific.

Specific comments

- Was just a basic recap of 101-5.
- Common sensor boundary (CSB), Div target list, Div Fire Plan, radar deployment order, and division FA support plan need to be included in Div OPORD.
- Materials did not really address how to perform O/C function, particularly at the see all station. Experience a big factor in participating at that station – particularly experience in BBS, Janus, and SIMNET.
- Had we stayed with the intent of [the Guides], the White Cell can and should play an important role.
- Order needs some work.

How well did the Observer Guide describe how to observe or obtain performance information regarding vertical integration of brigade and battalion?

- Fine, but knew the general parameter of what was to be done even w/out observer package.
- Adding your guide and observation package to what we already do as O/Cs gave more references to use.
- Materials were to a much greater detail than needed, but helpful as quick reference.
- To help an O/C understand the scope of the exercise. This was a good step by step lay-down for either a new O/C or an experienced one to track the intent and success of the exercise.
- Adequate for an experienced O/C.
- Adequately.
- Very little at all. I did not refer to them.
- Used the materials I already use.
- Materials provided focused on operations not FS.
- Yes, the observer guide described how to perform O/C duties (i.e., do not hover, the staff officer should [page 22]). It did not tell me the TOE for task operations.

PART 1. TRAINING SUPPORT PACKAGE (continued)

Brigade Observer (SOCT) Comments (continued)

How well did the Observer Guide describe how to observe or obtain performance information regarding brigade staff performance?

- Good guide as to what to observe.
- Helpful, but not necessary.
- Again, this was business as usual. So the matrix did not add or distract from this.
- It did not as I understood the materials.
- Did not help, but did not hurt.
- Not at all.
- None.

How well did the Observer Guide describe how to observe or obtain performance information regarding battlefield effects?

- Adequate.
- Did not help, but did not hinder. Should mention what data BBS and SIMNET can provide.
- Not very well.
- Did not.

How well did the Observer Guide describe how to provide feedback to the brigade staff?

- I used the slides of planning and preparation as a tool of focus.
- Gave good basic guidance for a new O/C.
- Material had a lot of detail, but seemed to be lock-step in approach. Needs flexibility to address areas of concern as they happen (i.e., HMMWV hood-top AARs).
- Marginal. Must be synched with Cdr's training objectives.
- For the overall AAR to the bde, it was a limitation. The materials themselves as far as cell AAR were adequate.
- Materials served as a reference handbook for overall staff operations, but were not specific enough to coach. Materials need to be battlefield operating system (BOS) specific. I utilized my own materials from the FA schoolhouse.
- Not as well as the AAR Pocket Guide.

PART 1. TRAINING SUPPORT PACKAGE (continued)

Brigade Observer (SOCT) Comments (continued)

How well did the Observer Guide describe how to provide feedback regarding the vertical integration of the brigade?

- Not necessary, but helpful.
- Adequately.
- No help.

How well did the Observer Guide describe how to participate in, and provide and obtain required info for White Cell meetings?

- Did it?
- Not sure.
- None.

Battalion Observer (Warthogs) Comments

General comments

- It is a nice pocket guide. Gave review of plan, prep, and recon planning doctrine. Liked the size of it. Has general use for general observations.
- Short, concise, straight to the point.
- Material in observer guide greatly enhanced this system.
- The guide was very clear on what needed to be done and on what products needed to be produced by whom.
- Materials pretty good about what to say [about providing feedback on vertical integration]. Sample plan and prep AAR slides a good guide for AARs.
- It broke down how the bn staff should support the scouts during TF mission. It showed how staff integration and advance planning would or could help the scouts be successful on the battlefield.

Specific comments

- The observation package is basically a reprint of the MTP which we all already have.
- Don't really need the material if you are well trained as an O/C since the materials are pretty much MTP/manual copies.
- It was the MTP, so it described doctrinally what the CTCP was required to provide for bde.
- [Problem was that] materials were limited to extracts of TOEs of the MTP.
- It lists the doctrinal references needed for research. But it is not 'stand alone' as an observation tool.
- It was just a photocopied MTP.

PART 1. TRAINING SUPPORT PACKAGE (continued)

Battalion Observer (Warthogs) Comments (continued)

- The material in the guide was an adequate guide for observation. Did not go into great detail on the performance of the function.
- There is no way that I was made aware of how to train/evaluate the Support (Spt) Platoon (Plt) Leader (Ldr) functions. Very general outline.
- No description of how to observe [battlefield effects]. Assumed O/Cs knew how to collect.
- There wasn't any formal take home package (THP)/observation matrix for TF staff O/Cs to provide written input to bde staff O/Cs.
- An issue of TSP content – are there things we left out because we assumed them to be normal procedure? Who gets my written feedback on co level performance?
- There were not any functional observations matrices to collect notes cross referenced with MTP tasks.
- Need modified TOEs to reflect subtasks not applicable in simulation or not appropriate for observation in simulation.
- Would be helpful it TOEs had a third column or space to write specific comments to provide more accurate and detailed feedback.
- Did not provide cues for this 'structured' exercise. No MEL (mission event list), no observation tasks for specific events. No observation tools for execution. Assumes we have execution.
- Maybe I missed it, but I never heard a one or two sentence statement on why we were doing this exercise. If the sole purpose was just to link BBS to SIMNET, why was that such a big deal and why did that require us to cover down on MDMP? I'm not complaining, it was a good exercise and the unit (and O/Cs) got a lot out of it, I just wonder what the big picture is.
- It would help realism if when the TF does a DATK, there is actually an enemy on the objective. Out of two TF DATKs, TF 1-101 was never really decisively engaged.
- Again, the OPFOR portrayed was poor. The units who come here expect the OPFOR to act at least a little like they are portrayed in TRADOC PAM 350-16. They were not arrayed correctly and reacted as they were not suppose to, which confused the unit needlessly, especially since the OPFOR was done so well in their SIMNET exercise the week before.
- OPFOR - not a good lay down on terrain, not controlled well for exercise.
- O/Cs were never given opportunity to scrub materials prior to exercise. Understanding these were drafts, there still should have been an opportunity to review these materials prior to exercise, i.e., initial startup personnel/log stats that were given to unit were incorrect.
- Did not like the Chief of Recon role. In our current FMs 71-1 & 17-98, this person does not exist. This role is played by the bn Command (Cmd)/bn S3. Often the people selected to Chief of Recon have never dealt with scouts before.

PART 2. STAFFING REQUIREMENTS

Brigade Staff Comments

- The administrative requirements were lengthy. The bde staff was not equipped with enough personnel to accomplish all the tasks.
- Another person in each cell should have been assigned to the administrative/logistics (A/L)radio.
- More personnel; one more for each cell could have been utilized.
- There simply were not enough personnel to accomplish all required tasks in a timely fashion. We need a larger cell at bde level and also at TF interactor/role-player level. We also need a larger and more proactive EXCON cell.
- Understaffed for objective evaluation analysis.
- From an engineer staff standpoint, our staff was extremely austere. What we expected would be 10-hour days turned out to be 20-hour days on average. Some consideration should be given to bringing the engineer battalion operations and plans section to the exercise.
- Start of the exercise was too much for their minimum staffs. There is much to do, and sorting through the data and participating in the MDMP is a challenge. It is realistic, but too fast paced for a minimal staff.
- The lack of bde troops players was frustrating to the Bde Rear. They were providing control, but were out of their expertise.
- Our minimal staff levels were not adequate for Bde Rear CP operations. In hindsight, the FSB Cdr would send only the Support Operations Officer and FSB S2/3. He would not have the FSB commander here unless the entire FSB staff was present. Only the Support Operations Officer (SOO) and S2/3 interact with the bde staff. The FSB Cdr interacts with the Bde Cdr and the Division Support Command (DISCOM) Cdr.
- Probably should have more robust role-play cells to support STOW (FSO).
- Training audience in this exercise could also have unit staffs supported by BBS and not SIMNET alone (ADCOORD).

TF 1-101 Staff Comments

- Time, short handed in personnel, trying to do too many things at once [during the parallel planning].
- The brigade staff did not send all the actual working main major staff members, but inserted substitutes. This does not harm training for the battalion but it does not allow for real bde/task force training to be done in a proper manner.

Brigade Workstation Team (Constructive Simulation) Comments

- No NCO back-up to prepare reports, post maps, status/battle-tracking. Less battle tracking means less reporting.
- Another problem is the small staff in the BBS cells - not enough people to run the battle and man the radios.

PART 2. STAFFING REQUIREMENTS (continued)

Brigade Workstation Team (Constructive Simulation) Comments (continued)

- Lack of personnel to transmit reports to higher headquarters (HQ) and update TF status info.
- Brigade probably did not understand the framework of this exercise. There was no way the 127th (or the 69th for that matter) task force was going to effectively plan and execute a mission without more key personnel (i.e. staff) to man both a tactical operations center (TOC) and the workcell. We did not have the personnel to perform both sides of this. The computer side of it and the tactical side of it (i.e., passing info to brigade TOC), but brigade initially expected us to develop an order as though we had a functioning TOC. There was not even a slot for a task force commander in the manning guidance (just S3 Operations [OPS]), yet brigade obviously expected more for the two supporting task forces (127th and 69th).
- The lack of personnel did not allow for normal traffic flow to higher, but was adequate for the TF.
- My role as TF Cdr is no different than I expected but I absolutely needed my TOC(-) staff. I should have had funding for 10-15.
- Keystroking became the most difficult task with trying to do and plan at the same time.

Brigade Observer (SOCT) Comments

- Absence of full staffs at the constructive bns was a definite minus for the exercise. Friendly BDA was sketchy in constructive due to puckster inexperience. Virtual seemed to be tracked/reported better. More O/Cs needed for constructive units.
- There were no ADA officers at bn level. With no one acting in the ADA role I had no one to look at other than the bde ADA. Also, SIMNET did not have any ADA equipment so it was hard to tell what effect it would have had on that unit. Feedback did not go anywhere; for the air defense, there was only one person in BBS and he was also doing the engineer (ENG).
- The engineer bn staff was not present for the STOW trial. Only the ABE and one Sergeant (Sgt) worked the trial. There were three other engineers in the BBS response cells (I/TF).

Battalion Observer (Warthogs) Comments

- Requires too much overhead (people) for the training.
- It was intended that I observe the spt plt ldr. The configuration of simulators/BBS workstations did not facilitate the spt plt ldr functions.
- Workaround requirements need to be reduced to help in resource efficiency and provide common effects. Example given was the artillery fires. Workaround requirements increase personnel requirement.

PART 3. SCHEDULE AND TIME ALLOCATIONS

Brigade Staff Comments

- AARs went too long detracting from training time. R&S fight was late. The R&S materials and a class should be distributed/trained prior to arrival.
- No problem; although classes and AARs took time away from the MDMP. AARs and briefings and rehearsals required a lot of juggling to attend.
- Unable to participate in recon due to MDMP AAR process.
- Fewer AARs -- no more than 2 per day. Maybe one late in the day.
- Too many AARs. They tended to interrupt the planning process and took them out of the net too long.
- Have AARs by phase, but no more than one per day. For FSB, one AAR for planning, another for preparation, and one for execution and one for consolidation would be enough.

EXCON Workstation Team Comments

- Received the OPORD at the beginning of the exercise, or basically the same time frame as the brigade did. As the Division rep, this was too late to extract required information (i.e., overall scheme of maneuver, intent, TF organization.
- Would have been beneficial to been here a few days earlier and perhaps rehearsed the OPORD and brief the bde.

Brigade Workstation Team (Constructive Simulation) Comments

- Time was biggest constraint. Very difficult to develop OPORD/R&S plan, etc, plus execute practice rehearsals. May be better to have bde basic order or prep done at home station, rehearsals and refinement at Ft Knox.

Battalion Observer (Warthog) Comments

- Need fewer formal AARs and more coaching.
- The ridiculously compressed time for the TF to produce a complex OPORD for a complex mission which may have been too difficult for their expertise at the time also transposed to the O/C team in their efforts to observe the planning. A unit should arrive with the OPORD ready to go so it can be observed in rehearsal and execution, AARd, then repeated with changes as a result of the AAR process.
- Timing of exercise a significant problem. Bde on a different timeline than bns and bde role-players. Planning, rehearsals, subordinate unit planning, and AARs not on a coherent schedule. As a result, no 1/3 - 2/3, little real coordination.

PART 4. TRAINING MODEL

Brigade Staff Comments

CSS comments

- CSS play fell short of the objective. Incorporated into the plan, but not fully executed. Went through Phase II & III, but not IV & V.
- I did not know the TF 1-101 had a player cell, but at my position, it made no difference. I would like to see an entire brigade done the same way. It would give us [FSB] a realistic training tool to track issues that would actually appear in combat ops. The admin-log cell had much to do to prepare for the battle, but we had little to do in the medical evacs, resupply during the battle, forward logistics element (FLE) and refuel on the move (ROM) operations, etc.
- If the exercise were conducted as a continuous exercise without system shutdowns, i.e., start the fight with the known personnel status data and fight the reconstitution effort from there it would have been much better.
- Play stopped just prior to the reconstitution efforts on the objective.
- The fact that equipment damaged did not remain down until CSS action was fully taken left our CSS players out of the action.
- Recommend that Div OPORD be given prior to arrival. Start the staff play at the rehearsal. This would allow more time for the staff S4 to remain in the staff cell and fully exercise the standing operating procedures (SOP). The exercise was great training tool the fact that play started at a point of less than 100%. CSS then became an issue for the TF and bde commander. Play should have continued through Phase V. This would have provided commanders an opportunity to focus on the CSS slice of the BOS!
- Rear activity could be another dimension of the exercise. Losses of CSS assets would cause changes in tactical planning.

Reports need to be pushed and 'GREEN-1' casualty Battalion Loss Reports to enhance replacement soldier ordering through the brigade S1 to allow CSS to do their job better and to have the medical chain operate to its potential - including ambulance exchange point (AXP) emplacement and operations, Air Ambulance utilization and battle loss report generation. At annual training (AT) - we also keep a report which lists: total patients, total held at BCS [Brigade Clearing Station] - FSB med Co - Total not return to duty (RTD), return to duty total. This would have been very realistic; maybe we can set up the BBS to reflect our AT report medical evac classes.

- Wanted more realism with DISCOM/Corps Support Command (COSCOM) interaction. The Bde Rear wanted to practice CP operations and CSS interactions, not just MDMP with the Bde Main. Since they needed all the players for the MDMP, they may as well have had a good CSS exercise also.
- There was no real interaction between recon and the Rear CP staff.
- The Bde Rear was frustrated that the consolidation phase was not carried out. They realized that many of the tasks that were done at the beginning of the exercise, but they did not have the chance to execute the plan that they prepared especially the FSB Cdr.

PART 4. TRAINING MODEL (continued)

Brigade Staff Comments (continued)

- Appreciated the O/C presence, but some (Rear) thought he was around too much.

Recon techniques and procedures

- Doctrinal materials (i.e., FM 101-5, etc.) have not been updated to focus the R&S effort as trained at STOW.
- Liked the use of our Annex L, as well as the process established in the materials.
- The recon planning process was almost done as a separate function of the MDMP, and as a result, I didn't get to discuss in detail the types of essential engineer info required of the recon effort, although this was the first time I've been able to actually get the engineer integrated into the recon plan -- very positive from the engineer perspective.
- The assistant S2 & Chief of Recon liked the process laid out in the books provided. Their unfamiliarity with the process made them hesitant to use it. They never had a Chief of Recon before, but like the usefulness of the position. They would have to practice it further in order to become proficient.
- The Ad Hoc Recon cell caused problems. Because they had never worked this process in this manner before, they did experience problems in the plan and prep of the recon order.

Plan vs. execute

- I would like to shift the emphasis more towards execution rather than planning. This could be accomplished by conducting two missions--offense and defense. However, the brigade staff must write and plan the missions. This could be accomplished by linking home station training (orders prep) with virtual (execution). The battalion TF commander & staff could also use some additional time in the planning phase, perhaps an additional 12 hours of possible strategy: Battle Command Battle Staff Training (BCBST) -- Home Station Planning -- STOWEX -- BCTP.

Exercise preparation

- The problem is that I received [the Guide] the day the exercise started. I did not have time to read it.
- TF S2s & S3s & Chief of Recon should all have been brought together early in the exercise and given the reconnaissance class.
- If I were to do this again, I would bring the staff shown in an AT status to allow more time to train-up.
- Since reserve component (RC) gets little chance to do this level of exercise, a gate should be doing a bde staff planning exercise with subordinates. Definitely need pre-STOW to do staff training.
- TF need a planning exercise with a Janus or BBS execute prior to this to work out their staff planning process.

PART 4. TRAINING MODEL (continued)

Brigade Staff Comments (continued)

AARs and Feedback

- The follow-up/AAR of parallel planning and subordinate plans should also include to some extent the role-play units to make the picture complete to the brigade on how well everything fits.

TF 1-101 Staff Comments

CSS comments

- Thought I learned a lot and afforded my soldiers to learn the things I was being taught at the staff level, I couldn't help noticing a disconnect or lesser priority on CSS problems. I had the same experience at BCBST and warfighter. We continue to get lost in the maneuver and focus on CSS only when the problem is overwhelming. 'Lessons learned: We haven't.' BCBST-97 CSS AAR = ditto STOWEX 98.

Recon techniques and procedures

- This was the first time a separate recon order was used and tasks coordinated by brigade. Brigade was a little slow in issuing the information, but more detailed than before. The plan used all the TFs scouts, and sent them to the south, while the TF went north. There was no follow on recon mission during the defensive phase of the operation. Process appears to be more effective than previous methods, but requires more experience and detail. Bde and bns need to work closer on this.
- No preference on recon order vs. recon annex, providing that the information arrived on time, TF has 2/3 available time prior to execution. If written as annex to OPORD, annex has to be issued prior to the order in some cases.

Exercise preparation

- I would have liked to have received [the Guide] sooner so that I could read it, tab, highlight, etc. By the time we received it, we were already too busy to read it.
- Earlier receipt of the books would have assisted the TF immeasurably. [We] did not have the time to fully study them, an early AAR or discussion of them may have assisted assimilation across the staff.
- STOW is a great starting place, but more needs to be done to involve the supporting units to help them work with the maneuver units. These units tend to train in a vacuum and isolated from each other and don't practice the art of pulling together all the pieces of the pie. The week and a half we used prior to the STOW mission was a great assistance to get used to the simulation and working out bugs. Recommend at least 3-5 days train up to any exercise in SIMNET.
- It is critical that the battalion be proficient in SIMNET before attempting STOW. A sister battalion in BBS will 'out move' and 'out fight' a SIMNET battalion unless the SIMNET battalion has reached a base level of proficiency.

PART 4. TRAINING MODEL (continued)

TF 1-101 Staff Comments (continued)

- The staff was unanimous on the value of the SIMNET training prior to the STOWEX. They do not believe a unit could come in off the street and participate in STOW without conducting the plt, co, and bn VTP. Especially with the other bns in BBS were here are no communication problems with subordinate units, and subordinate units don't get lost. They also stated that some additional training of bn planning procedures would have been beneficial, as well as some combined staff training with the brigade. They do not get a chance to interact with the bde staff often, and this decreased the cohesiveness of parallel planning within the brigade.

AARs and feedback

- An AAR (after bde warning orders [WARNOs]) oriented on unit discussion, facilitated by an O/C would have assisted the planning process. A brigade representative should be present. The staff could have focused on the information received, what has been done with it, and how we could do it different in the future. Could also have focused on staff interaction, and coordination with bde. Bde presence would have allowed them to discuss the content of the bde WARNOs, provide bottom up feedback to what info helps the bn.

Difficulty level

- Multiple WARNOs for recon and for the DATK: A little too much for the TF to handle. Would have been better to incorporate recon instructions into the WARNOs for the DATK. Or just issue all as WARNOs, separate titles for WARNOs can be hard to track.

Enough work for all participants

- While [there is] a lull in reconnaissance/surveillance exercise, do IPB for deliberate attack. Maybe in the future, a TOC simulator can be created. Such as trying to report battle track while the TOC is moving/artillery rounds impacting because of too much radio time.
- There was not any CSM play/role in the STOWEX other than real world issues.

Fatigue

- A training day should be included in the training schedule for exercise participants to recover. Soldiers were exhausted, as were leaders.
- Interest level of soldiers was excellent until Thurs night when redundancy of last mission combined with computer problems and mental tiredness brought level down.
- Two STOWEX missions in the same day, after 9 straight days of training is too much. By 1400, the TF was burned out. Either there must be a break before the STOWEX mission or limit to one mission per day.

PART 4. TRAINING MODEL (continued)

TF 1-101 Subordinate Unit (Virtual Simulation) Comments

CSS comments

- As the XO, my primary concern is maintenance. Because we got recocked each time, we never had any ongoing maintenance issues.

Exercise preparation

- It needed to be in my hands at least 4 months ago.
- My command did not receive any of the preparatory materials for the past two weeks plt, co, bn, STOWEX with any resemblance of lead-time for train-up. I have yet to receive a straight answer on why.
- Without receiving preparatory materials, and without sufficient planning time, it is my opinion that I was never a participant in a deliberate attack. I have been to the NTC and what I participated in was a hasty attack.
- We didn't get [the Guides] soon enough and by then we were pretty focused on our own procedures.
- We were able to perform our duties and practice deliberate attack. It was effortless once the plt was able to learn to move in formation in SIMNET world.
- A class followed by a practice session on a minefield breach, use of smoke or lack there of, and passage of the assault force through the breach force was needed prior to the rehearsal.
- We (the scout platoon) learned a lot from the scout tables we did in VTP. AARs, feedback, O/Cs.

Enough work for all participants

- I was supposed to play the Spt Plt Ldr role. However, there wasn't a station for the Spt Plt Ldr, therefore, I could not participate.
- Supervision is difficult because other than monitoring radios, there is little for the crew to do.
- (Driver) I think that the tank commanders and their crews should not be that involved with bn movements so much. If an exercise is of a large scale nature, then gather all the 'brass' and 'co' and 'XO' and use a computer generated brigade to do the mission. At the same time, have all TC and their crews doing missions or 'berm drills' on fire on contact or platoon level missions.
- (Gunner) I have learned a lot in battalion exercises, but not really much in brigade.
- (Loader) Great training at plt and co. But after the bn exercise, I felt [STOW exercise] was more a command exercise and probably could be done without crews sitting so much.
- (TC) I was pleased to be able to take part, but I received better training at the plt and co level.

PART 4. TRAINING MODEL (continued)

TF 1-101 Subordinate Unit (Virtual Simulation) Comments (continued)

- (TC) It seems pretty ridiculous to have soldiers sit through four hours of nothing for 10 minutes of maneuver and combat. More enemy encounters and more realism (other than the boredom) would make the training significantly more effective.
- Waiting in sims for 3-4 hours was our number 1 frustration.

Fatigue

- Trying to do two missions in one day is too taxing on the people in the sims. Only allow one execution per day.

Value of simulation

- It may be cheaper, but you cannot judge an exercise when the men are sleeping in barracks. The defense is not suited to this. Too much cannot be done, such as lasing wire, digging, dismount ops and so forth.
- At company level, I don't think there is a big (if any) difference in how we executed our duties.

EXCON Workstation Team Comments

CSS comments

- Real world logistics weakest part of the exercise, especially in the area of transportation.

Exercise preparation

- EXCON players should come a day earlier to be given more time to prepare. I would have liked to participate in briefing the Division Order.
- I would have liked to have played the division a little more extensively. Possibly developing cross boundary fire support issues.
- Briefing the Division OPORD . . . would have helped to develop our role and subsequent interaction with the bde.
- Recommend EXCON Player brief the OPORD to the bde.

Difficulty level

- The schedule should allow for 2 days of the main fight. This could allow for presentation of multiple scripts with enough changed to force the bde to 'react on the fly' when plans are radically altered by actual enemy actions.

PART 4. TRAINING MODEL (continued)

Brigade Workstation Team (Constructive Simulation) Comments

CSS comments

- I wish I was more informed of my duties in specific by the role-player [guide]. They usually just think about the fight and forget about how they are going to sustain it with their logistical assets. They usually use less than 50% of their equipment. Limiting their total force capabilities. 'Fighting first and logistics last in today's military forces will not get you far.

Exercise preparation

- I would have liked to have received the guide at least a week prior to the exercise.
- A copy [of the Guide] provided prior to arrival would have given additional insight to the BBS system.
- I would have liked an additional day or two of free play practice apart from the virtual component as an interactor, I spent a lot of time fighting the interface.
- I will say again the very same comment I have made after all of the other BBS exercises. The computer operator must be trained on the computer at least 3 to 5 days prior to start of exercise. They must be trained and ready to go at the very start of the exercise. They must be able to execute computer commands immediately without referencing operator guide.

Brigade Observer (SOCT) Comments

CSS comments

- In CSS arena, we must make time available to fully exercise all BOSs. We wish it away most times. This exercise did make an honest effort to exercise CSS in the prep stage and should provide a good base for improvement for future exercises.

Plan vs. execute

- The ability to O/C this process was hindered in the fact that TF 1-101 was not involved in the planning/prep process until almost the release of the bde order. This adversely affected parallel planning.
- To fully test the STOW process, more emphasis needed to be placed on execution vs. MDMP.

Exercise preparation

- The O/C had to develop the data collection plan and set TOE [training and evaluation outline] for the DATK mission. How could I show up on Friday night of an inactive duty for training (IDT) and get read in on the division order, brigade order, intelligence, develop data collection plan and get all TOE for mission Saturday morning.
- The guide, in and of itself, is something that you would not want to carry around with you during an exercise. It needs to be delivered to prospective O/Cs in a timely manner, giving them enough time to properly review the packet.

PART 4. TRAINING MODEL (continued)

Brigade Observer (SOCT) Comments (continued)

- For the exercise two TF were simulated. The one TF which did play got into the exercise planning and prep late due to its involvement on other training.

AARs, feedback, O/Cs

- Must be professionally O/C'd. Units can't play and O/C simultaneously. Sister units are no more capable than unit being trained.
- [Providing feedback] was not a problem since we used a normal 'cell AAR' process at appropriate times; lack of standard 'game produced' AAR charts hampered AAR process at bde level.

Difficulty level

- Breaching at bde level is graduate level stuff.

Exercise control

- Closer communication among O/Cs, unit, and sim personnel would have been helpful.
- I needed a direct link or control over the OPFOR. It is a training tool, used by the Senior O/C to accomplish the unit's training objectives. I function as the Senior O/Cs control for the OPFOR. In this exercise, the OPFOR was a hindrance, not a contribution to training.
- White cell should be run like it is at NTC. The COG runs it. OPFOR briefs enemy actions for next 24 hours and MEL list is discussed.

Battalion Observer (Warthog) Comments

CSS comments

- CSS functions always take a back seat to maneuver, which is understandable and this exercise was no different.
- Don't really understand how we can play/observe CSS realistically without going to something that looks a lot like 24-hour operations.

Plan vs. execute

- Integration of planning and preparation into the exercise. The VTP is a 'structured' training program, turn key, that facilitates emphasis on execution. When plan and prep are included into the exercise, additional time needs to be allotted for coaching and teaching less proficient units in the MDMP, particularly for staffs. When the emphasis is on execution, the structured program applies because plan and prep is not the training objective. It does little to train a staff, other than battle tracking. The staff is best exercised in the application of the orders process which is more time intensive.

Exercise Preparation

- It would have been good to have received it earlier.

PART 4. TRAINING MODEL (continued)

Battalion Observer (Warthog) Comments (continued)

- Personnel requirements and home station 'spin-up activities make more sense of a MDMP split (home vs. Knox) and type mission change. AARs, feedback, O/Cs.
- Issue of training impact and value when unit must do planning at Knox. Seems there would be more value if execution only at Knox. Current Warthog manning does not permit the observation of parallel planning efforts. Partially due to the VTP effect - planning beginning while VTP still being implemented. Would be best as second week of AT, with first week spent on intensive staff training.
- A STOW familiarization activity might serve the unit well. Even when the vision of STOW is realized. This will enable the unit to learn idiosyncrasies of STOW. Additional considerations, impacting training strategy for STOW.
- Advance materials package will be needed for home station MDMP stages.

Difficulty level

- Mission selection was not the right fit for a National Guard (NG) unit (general statement) with the level of experience that existed (specific statement). The complexity and level of activity in planning and executing a DATK placed stress on and reduced the effectiveness of the value added by STOW. The DATK may be too complex for the NG to execute cold. The STOW is a run (vs. crawl or walk) exercise. The brigade staff's first product was a STOW order (hit the ground running).
- A poor mission to use for a structured exercise. Too complex for this unit.
- There is not time during the exercise to focus on all of the tasks listed. We are not in the evaluation (i.e., MTP GO or NO GO and a rating T/P/U) business. During VTP, we focus on critical subtasks and combat functions and focus our AAR around those.

Enough work for all participants

- Simulation training above bn level involves a lot of down time for tank and Bradley crews.

Value of simulation

- I thought the use of the DRS for the 1SG was great. It involved him in the action and is an excellent method to train CSS in a simulation environment.
- The STOW is a great training idea in concept, but it is suffering from an add on syndrome common to the development of most Army systems. The technology is outstanding, but it is sensitive. When we take the hardware, software, and TSP material designed to support Co/TF level SIMNET and stress that system to support bde level exercises, then the add-ons start showing up. The term workaround becomes common place and I think that there is a less than adequate approach to training. It may be the best we can do today but it should not be the best we can do tomorrow. The systems have to provide the units in training the most realistic environment we can produce. To fall into the comfort zone of rationalization is a no-go.

PART 4. TRAINING MODEL (continued)

Battalion Observer (Warthog) Comments (continued)

- DRSs for first sergeants was a great asset. It allowed them to be executors of the CSS plan. It provided great training for CTCP because real time reports were being generated at company level and gave unit opportunity to work on the SOPs and procedures. STOW is a good training concept for virtual bn and constructive bde. It allows all involved to work on (at the staff level) staff level both vertically and horizontally. However, I don't think the technology is ready yet.
- Consider using CLS operators as interactors for BBS.

Appendix C.
COBRAS Personnel Comments on the STOW Exercise Trial

CSS Functionality Observations

Note:

1. Class (CL) VIII and IX. No problems noted. The casualties and broken vehicles in BBS were treated and repaired as usual whether they were aggregated or disaggregated.

2. Field Services, EPW Operations, and Dislocated Civilian Operations. Not used in this exercise.

3. Medical. Wounded from SIMNET vehicles appeared in the CSH unit in BBS (the default medical unit for HICON). Some wounded made it through treatment to convalescence, others died in treatment. This function works adequately.

Observations

1. CL I and Water.

a. Once the STOW link was made, the SIMNET entities appeared in BBS with normal amounts of CL I and water. However, the BBS role-player was not required to report this information to the CTCP. Since tracking CL I and water are not really execution tasks, there were no problems noted.

b. There is no bulk water capability in STOW. The water trailers and 5T water truck used in BBSE were not available. As a result, replenishment of water was done solely with 5 gal water cans. This caused the brigade units to use cargo hauling capacity in HEMTT cargo (CGO) trucks for water cans and to make many more trips hauling 5 gal cans to their icons. The brigade also had difficulty positioning the chemical decon detachment for decontamination since there were no water trucks, trailers, or storage bags. I had to magically resupply the decon unit once it

arrived at the decon point. Recommend that bulk water as a supply and bulk haul by truck or trailer be STOW-capable.

2. CL III (Bulk).

a. BBS icons appeared to lose all of their fuel in the vehicles when they were disaggregated. Sometimes the fuel suddenly reappeared, sometimes it didn't. It required constant checking of each disaggregated vehicle and (magic) resupply as necessary. It kept several CLS personnel busy with this, caused tactical delays, and precluded accurate CSS consumption from occurring. It is essential that fuel not be lost when disaggregating vehicles.

b. The only vehicle STOW-capable of storing and transporting fuel was the HEMTT JP8 tanker. It was used as an unacceptable substitute for other vehicles: Tank and Pump Units in non-maneuver units, 5,000 gallon tankers in the FSB and DISCOM. Recommend that 5,000 gal tankers be STOW-capable.

3. CL IV. Only concertina wire is available in BBS. Units have learned to live with no other barrier material (i.e., lumber).

4. CL V.

a. Disaggregated scout HMMWVs had to have their .50 cal munitions zeroed out to allow them to move. Leaving the .50 cal on the vehicle caused it to loose all fuel (and stop). Similar problems occurred with mortars. It is essential that scouts have some means of protecting themselves.

b. Small arms munitions are not STOW-compatible. As a result, all weapons were removed from the FSB, many brigade troops units, and the CSS platoons of the maneuver units. The training units (and SOCT) quickly picked up that they could not defend themselves, and questioned our design. I was forced to admit there was no rear area threat that the units needed to defend themselves against.

c. The constrained use of mines in BBSE was further limited in STOW.

d. Copperhead munitions were not listed on the ISP reports. They were mentioned in the BBSE workarounds. This is the first trial that the training audience made the link between the logistics reports and the fire support workaround.

5. CL VII. Had to change at least 18 vehicles to HEMTTs and/or HMMWVs since STOW would not accommodate common vehicles. This was a major distracter to the logisticians of the brigade. There were also fewer engineer vehicles.

CSS Functionality Observations (continued)

6. Maintenance.

a. There were problems with the new option in BBS that allows vehicles returning from maintenance to be issued with replacement personnel. Workstation teams mistakenly created new personnel and often overloaded units with too many personnel for their vehicles to transport. This option makes sense for vehicles returning from general support (GS) level maintenance, but not at organizational or direct support (DS) level.

b. Vehicles that break in SIMNET and ModSAF apparently do not map over to BBS. The serviceable vehicles can appear on BBS roll-up reports, as do combat losses; but the vehicles that require maintenance do not appear. No vehicles from SIMNET or ModSAF ever appeared in any BBS maintenance unit. Recommend that maintenance faults in SIMNET and ModSAF be sent to BBS to allow the reorganization phase to occur. A report of mobility or firepower kill is adequate for the execution phase, but not for reorganization.

7. Transportation. Since the only cargo vehicle in STOW is a HEMTT CGO, there was limited haul capability in the FSB and DISCOM. This caused multiple trips for vehicles and use of magic resupply for supply and personnel operations. There must be larger vehicles for the FSB and DISCOM to transport supplies and personnel.

8. Personnel.

a. The personnel roll-up report in BBS still sums incorrectly. It has been incorrect in BBS versions 3, 4, and 5. It must be fixed!

b. There were problems with the new option in BBS that allows vehicles returning from maintenance to be issued with replacement personnel. Workstation teams mistakenly created new personnel and often overloaded units with too many personnel for their vehicles to transport. This option makes sense for vehicles returning from GS level maintenance, but not at organizational level.

c. Personnel replacements lose their identity (their parent unit) if transferred incorrectly. The procedures in our workstation guide do work if followed precisely.

9. AAR Capability. The AAR summary reports in BBS (i.e., kill ratios, munitions used) were not used. We did not suggest their use in observation guides, nor did SOCT.

10. Unmanned Aerial Vehicle (UAV).

a. Our procedures to use the UAV at EXCON appeared to work. The UAV still sees "too much" so we have the OPFOR Controller delete entries so the Bde S2 does not get everything.

CSS Functionality Observations (continued)

b. The routing of alerts on the EXCON BBS terminal caused some confusion when printing UAV alerts. There were so many alerts from the other terminals that the print buffer cleared and sent duplicate entries to the printer.

11. CL II, VI, and X. Not used in BBS, ModSAF, or SIMNET.

Engineer Observations

1. General. From an engineer perspective for STOW to be viable, or even moderately useful, several modifications will be required. These modifications fall into the broad categories of equipment mapping, mine signatures, lane marking, and earthwork. The goal of these proposed changes would be to make STOW more similar to constructive simulation, in terms of the capabilities it replicates, and thus make STOW more similar to reality.

2. Equipment mapping. All mission critical engineer equipment must be "playable" in a STOW exercise. This is especially true of those items of equipment which contribute to mission success and which would be seen by training participants operating from the virtual environment. At this time, AVLB bridges, earthmovers (M9 ACEs and bulldozers), and Volcanoes do not map. Mine clearing line charge (MICLIC) does map, but unfortunately it maps only as a trailer moving around the battlefield sans prime mover - clearly not a useful signature to have on the battlefield.

3. Mine signatures. STOW mines - more accurately minefields - have no signature. Constructive simulation provides a signature after the minefield has been reconnoitered. On the virtual side of STOW, no corresponding signature exists. This means that all minefields are buried and that is not an accurate portrayal of how the threat might elect to employ mines because in many cases there is an advantage to having an adversary know that a given location is mined.

4. Lane marking. STOW minefield lane markings are limited to SIMNET-type red and white sign markings. Units need to be able to employ the full range of minefield markings described in Appendix E, FM 90-13-1.

5. Earthmoving. The virtual side of STOW does not support terrain modification such as the construction of tank ditches or vehicle fighting positions. In order to achieve the level of realism found in CCTT, STOW should be enhanced to allow earthmoving operations. If this is not done, STOW will not be useful for conducting defensive operations or deliberate attacks.

6. The BBS engineer "Reconminefield" option should map to ModSAF and SIMNET in a manner similar to what occurs in BBS when this option conducted. Once the minefields are "Reconned" and displayed on the BBS terminal that performed the "Recon," then the minefield portrayed in ModSAF should be marked with minefields. This marking should appear on the side of the minefield that the "Recon" unit performed the mission from.

Fires Observations

1. If mortars (or artillery, unlikely) are being used in virtual those should map into constructive to allow the constructive target acquisition radars to acquire them.

2. The mapping of Paladin needs consideration if Fire Support Combined Arms Tactical Trainer (FSCATT) is going to be part of STOW.

3. The artillery and mortars fired in constructive should map into virtual and show effects of the munitions and appearance of the sheaf on the ground. Effects should reflect the weapons systems in the inventory: 60mm mortar, 81mm mortar, 107mm mortar, 120mm mortar, 105mm howitzer, 155 howitzer, multiple launch rocket system (MLRS) (not sure if 203mm howitzer is needed, but what the heck, include it). Munition mapping needs to include both hexachloroethane (HC) (white and various colored) and white phosphorus (WP) smoke to include the different burn times and build up times, visual difference of dual purpose improved conventional munition (DPICM)/anti-personnel improved conventional munition (APICM) and high explosive (HE).

4. Family of scatterable mines (FASCAM) should map without the problem of conflicts with the "mine box" in SIMNET.

5. Illumination rounds should map, along with the capability to turn out the lights for night operations.

6. Copperhead should map in both simulations. Additionally, the linkage of an observer needs to be addressed as it is in the JANUS simulation. This addresses the geometry problem that is key in its employment. Linking an observer with laser into the simulation should also be tied to remote lasing for the APACHE helicopter.

7. Both simulations should allow user interface to input observer corrections to indirect fires as easily as a fire direction center (FDC) could input them. Currently, the BBS can't do this very efficiently, even with a workaround.

8. Enemy artillery needs to map chemical munitions into both simulations with the appropriate effects of the burst and the degradation.

9. Aircraft in constructive should map into virtual along with their weapons effects delivered. Includes both rotary and fixed wing. May have to map the other direction if aircraft simulators are playing in virtual combat.

Intelligence Functionality Observations

1. Range requirements 3000K & 2100K (BMP and Tank) limit engagements and severely limit OPFOR systems. The default auto engagement range for disaggregated BBS units is 2500m. We agreed to change these ranges based on the rehearsal. However, the 2500m range is still a limitation from the BBS perspective.

2. When artillery went from Aggregated to Disaggregated, all ammunition was lost.

Intelligence Functionality Observations (continued)

3. Reconnaissance Assets.

a. UAV. This is possible; was not made available to the bde but was maintained at Div.

b. Electronic Warfare (EW). No assets available in BBS to realistically portray capabilities. This is possible but was not made available.

c. Scouts. Limited to playing in BBS or DRS. Limited dismount capabilities. Dismount capabilities in BBS are good; however, they can't dismount any firepower because small arms weapons don't map to ModSAF and SIMNET. DRSs in their current configuration don't help much in any aspect of the scout mission.

4. OPFOR Assets.

a. T-80. Does not map/not played; lose the Night Capability; long Range Fires with AT-8 missile; greater survivability against M1. T-80s don't map but T-72 can. In fact in the NSC version of STOW, the T-72 maps with the AT-8 missile. We disabled that function. We also could have given the T-72 a night sight capability if we wanted to.

b. BRDM. Does not map/not played; lose long range fire from anti-tank weapon; recon at any level not represented.

c. Infantry (Inf) (Plt and Individual). Does not map/not played; no dismounted Inf or OP capability for recon.

d. Engineer. Does not map/not played; cannot replicate emplacing minefields nor breaching. Not necessarily true. We could have replicated the emplacement of OPFOR minefields, but OPFOR couldn't actually perform minefield emplacement missions like the BLUFOR can. In our STOWEX it may not have been critical.

e. Wire Obstacles. Do not map/not played; reduces obstacle planning.

f. Field Artillery (2S1s). Do not map/not played; requires replication with assets not normally found at that level.

g. Small Arms. Do not map/not played; no machine gun (MG), grenade launchers, other Inf Plt weapons; loss of combat power.

h. Tank Ditches. Do not map/not played; decreases defensive capabilities.

i. Aviation (Rotary and Fixed Wing). Does not map/not played, icons must be created in SIMNET and flown in both areas to replicate.

j. Chemical (both Persistent and Non-Persistent). Does not map/not played.

Intelligence Functionality Observations (continued)

k. FASCAM. Does not map/not played; must manually employ using magic minefield. FASCAM does map; however, we must control the location and density because any minefield that is emplaced or fired into the virtual minefield playbox is an entity that effects the virtual computer systems. Thus, very strict control on FASCAM.

l. ADA Hand-Held Weapons. Do not map; reduces ADA threat.

m. T-12, A245m at GUN. Does not map/not played, reduces fire power capabilities in motorized rifle battalion (MRB) defense and flank security in the offense.

Chemical Observations

1. Nuclear, Biological, Chemical Attacks. NBC attacks should map across all systems (currently BBS only). Observers in both virtual and constructive sims should be able to observe the "uniqueness" of NBC attacks (Nuclear - flash, blast, shock, mushroom cloud; Chemical - airburst artillery for persistent agent attacks, ground burst for nonpersistent, less explosive rounds).

2. NBC effects on operations. Current capability is for minimal degradation effects in BBS only. Need more realistic effects across all simulations.

a. BBS: Increase realism of degradation - decrease weapon and reconnaissance, surveillance, target acquisition (RSTA) systems effectiveness and ranges, decrease vehicle speeds (especially when increasing mission-oriented protective posture [MOPP] level - at least have the units stop when they're donning MOPP gear), allow units with collective protection to use their capabilities.

b. Virtual: Chemical - Force crews to operate at various levels of MOPP. Possible interactive system similar to MILES II/SAWE; i.e., if a vehicle is in a contaminated area or has been contaminated, the crew must mask, with a sensor that attaches to the mask to ensure it's properly sealed. If a crew member does not properly wear mask, that station in the vehicle shuts down, crew member assessed as a casualty; station only comes up if another crew member, adequately protected, hooks up to that station's sensor. Also need chemical alarm capability - give a unit warning if they put out their alarms. Nuclear - "forced degradation" (shut down of vehicle stations) occurs if a vehicle remains in a contaminated area for a sustained time period.

3. Smoke operations. Smoke should map between all systems and cause realistic degradation; i.e., HC smoke degrades visual systems and forces use of thermal systems; WP degrades visual and thermal systems; multispectral degrades visual, thermal, and electronic systems (currently BBS only).

4. Smoke unit capabilities. Current capability is for BBS static missions only. Different type smoke units (M1059, M1057, M58) should map between all simulation systems and should be able to operate either statically or mobile. Should also develop a virtual simulator/DRS to

replicate a smoke generator vehicle - force smokers to practice coordination with supported units, movement techniques, use of own smoke to support self-survivability.

Chemical Observations (continued)

5. NBC Recon operations. FOX should map between all systems (currently BBS only). FOX also needs the capability to mark contaminated area/route as it detects contamination - markings/markers should map between all systems. FOX capability should also be increased to match that of the M93A1, with remote agent cloud detection capability. Same holds true for non-FOX NBC recon operations, i.e. scouts, military police (MPs), other units. Constructive and virtual units of all types should have the capability to conduct NBC recon, mark contamination, and have markers map between systems.

6. Decon operations. Virtual simulation needs to take decontamination status into account for longer duration exercises, i.e. if a virtual unit is not decontaminated, they start to take casualties after a predetermined period of time. Same requirement for mapping across all simulations. Currently decon is BBS only.

7. Biological warfare. Only requirement would be for the Biological Identification and Detection System (BIDS) to map between systems so units can adapt to finding the thing somewhere on the battlefield (when the use of their battlespace has not been coordinated, which is wont to happen with upper echelon chemical units!).

Air Defense Artillery Observations

1. Air Defense Artillery (ADA)

a. In STOW-ET, aggregated units (ADA?) detected and engaged aggregated aircraft, and disaggregated units (ADA?) detected and engaged ModSAF opposing aircraft.

b. Task organizing ADA with other units causes the workstation team to decide the unit type and if not designated type ADA to loose capability. Workaround for mounted is to keep ADA separate units as part of a group. Workaround to provide Avenger in lieu of MANPADS was not acceptable -- No workaround for MANPADS team with another unit type while in transit or upon arrival (no dismounts anyhow).

c. Air to surface anti-radiation missiles (ARM) should not attack passive acquisition air defense systems. Workaround was ARMs were excluded from the database.

d. ADA should be able to detect and engage UAV within system limitations. Workaround was to limit time on station for the UAV.

e. OPFOR types of aircraft (esp. Frogfoot and HIND) images need to be visually represented in SIMNET (magview). Workaround was to have U.S. aircraft images represent OPFOR aircraft.

f. Recommendations:

Air Defense Artillery Observations (continued)

- ADA teams and units should be able to task organize and retain full mission capabilities.
- ADA MANPADS teams should be able to dismount and perform their mission.
- ADA capable units should be able to detect, acquire, and engage any airborne object or objects (within the ADA system's capabilities).

2. Aviation.

a. In STOW-ET, aggregated reconnaissance (RECCE) (fixed wing) aircraft reported aggregated ground units; aggregated aircraft attacked aggregated opposing ground units; and disaggregated aircraft attacked disaggregated opposing ground units.

b. Air missions flown in BBS need to be reflected in ModSAF/SIMNET. Workaround was to fly missions in both BBS and ModSAF.

c. Air mission weapons effects in one model need to be reflected in the others. Workaround was to fly missions in both BBS and ModSAF.

d. Recommendations:

- All aircraft flown in any part of the simulation should be reflected across the simulation.
- All aircraft weapons employed in any part of the simulation should have the weapon effects reflected across the simulation at the point of attack.
- RECCE missions flown in any part of the simulation should detect and report on units (within its detection capability) across the simulation.
- Aircraft images for virtual views should include identifiable airframe types corresponding to the type aircraft performing the mission.

3. Control Activities.

a. In STOW-ET, UAV collected and reported detailed information on aggregated and disaggregated OPFOR units; the Q37 reported artillery fires (aggregated/disaggregated?) detection for counterbattery missions; and disaggregated units and aggregated units were displayed on the plan view display (PVD). Status, source and activity information on units was provided. Minefields (not to scale)/breach lanes, graphical control measures, and representations of terrain were displayed on the PVD. Destroyed ModSAF units were identified on the PVD.

b. Weather effects entered in BBS were not reflected in ModSAF/SIMNET. Workaround was good weather.

c. Light conditions entered in BBS were not reflected in ModSAF/SIMNET. Workaround was daylight operations.

Air Defense Artillery Observations (continued)

d. Ghost units on the PVD caused problems with tracking battlefield activities of units. Required that suspect units be verified.

e. Combat incapable aggregated units should be discernible from capable units on the PVD. Only way to confirm was checking for units removed from the battle.

f. Recommendations:

- Weather effects need to be reflected across the simulation to include temperature, cloud cover, wind direction, and speed, humidity, rain, snow, ice, fog, and barometric pressure with the associated effects on systems' capability, mobility, and visibility.
- Light conditions need to be reflected across the simulation to include variable light conditions during hours of darkness.
- A "see all" display which provides information on unit status, activity, and mission capability should be available for control purposes. The display provides terrain representation, displays graphical control measures, and unit/location information.
- Exercise time adjustment capabilities should be available to controllers without restarting the scenario or as an alternative initiating the scenario with a new time should take less than 5 minutes.
- Provide means to rapidly obtain and record unit or collective status by selected category(s), selectively grouped as desired by a controller. The status reported is accurate for the unit(s) across the simulation.
- Provide rehearsal tools for the simulated environment much like that in the real world so units may conduct full rehearsals on the simulated terrain.

Technical Control Observations

1. Observations:

a. Activating the BBS confirm supply option at the FSB workstation resulted in a "stack dump" (crash) of the BBS, VAX computer supporting the FSB workstation.

b. Engineer type units were not able to perform the "Reconminefield" function in the STOW mode.

c. When some BBS units were Disaggregated, they lost all of their fuel and ammo. Specific examples were:

- OPFOR 2S3s & 2S5s lost all their ammo
- Scout HMMWVs lost all their ammo until we removed the .50 cal MG from the BBS icon.

Technical Control Observations (continued)

d. Units with trailers did not map properly when Disaggregated. The trailers were not connected to the prime mover and moved with the prime mover without being connected. There is no way to connect the trailers.

e. Most BBS Artillery did not map from BBS through ModSAF to SIMNET. Many rounds mapped from BBS to ModSAF but, most didn't map from ModSAF to SIMNET.

- BBS BLUFOR M109A6 HE rounds were the only rounds that mapped correctly.
- No BBS BLUFOR M109A6 smoke or DPICM mapped correctly.
- No BBS Mortar rounds mapped correctly.
- No BBS OPFOR rounds mapped correctly.

f. Use of the STOW Sphere of Influence option worked well as long as the Auto Disag. option was also being used. This also reduced the amount of manual control required by the Tech control team.

g. Use of the "dead hulk" play box allowed us to have the results of constructive fights appear to the virtual force(s) as they passed through or by an area where the constructive only fight occurred.

h. Use of the Legacy Application Adapter (LAA) to aggregate SIMNET and ModSAF forces was a positive. This reduced the number of units/icons names sent to and tracked by BBS.

i. The down side to "h" was that when SIMNET or ModSAF vehicles are aggregated into larger units you cannot delete that vehicle from the aggregated LAA group and you can't add the reconstituted vehicle to the LAA group. As a result the vehicle is tracked twice by BBS, once as part of the aggregated group it was originally in, and also as a new entity by itself.

2. Known STOW limitations the COBRAS STOWEX was designed around:

a. Not all BBS vehicles/weapons correctly map to ModSAF. Maybe 40%. Generally, Combat Arms assets mapped the best followed by CS assets, then CSS assets.

b. Not all ModSAF vehicles correctly map to SIMNET. Maybe 50%. Generally, Combat Arms assets mapped the best followed by CS assets, then CSS assets.

c. Dismounted forces and associated small arms and anti-tank weapons do not map.

d. NSC does not recommend building forces larger than platoon size because ModSAF does not model company maneuver well. (We built some forces at company level with the expectation that these forces would never be Disaggregated.)

Technical Control Observations (continued)

e. OPFOR and BLUFOR Aircraft do not map between BBS and ModSAF. As a result aircraft were built in both simulation systems.

f. The only BBS CSS function that may map to ModSAF and SIMNET is the "tailgate" resupply function. This can only be done with individual vehicle "split-out" units.

- Recovery of ModSAF vehicles or SIMNET CVSs does not map
- Repair of ModSAF vehicles or SIMNET CVSs does not map
- Personnel losses within ModSAF vehicles or SIMNET CVSs does not occur thus, medical evacuation does not map correctly. (The LAA will evacuate SIMNET and ModSAF personnel, but there is no way for the personnel occupying or managing these vehicles to know what was evacuated. As a result the live reporting of personnel losses using a "MILES Card" will not match what was sent to BBS via the LAA. Thus, my comment on not mapping correctly.) We did not use this because the "tailgate" resupply function causes other problems because of the way ModSAF is modeled.
- The HEMTT conducting the resupply will attempt to resupply every vehicle within 1000m of it even though you may only want to resupply only one or two vehicles within its 1000m radius.
- The HEMTT will crash into the vehicle being resupplied four to five times after it has completed the resupply task. (Lockheed martin says that it has fixed this problem in its current version, which we didn't have/use.)

g. BBS personnel reporting is still broken.

h. Disaggregated BBS units default auto engagement range is set for 2500m. These can be manually changed from BBS after the unit is Disaggregated.

i. Engineer obstacles such as tank ditches, wire, and craters do not map to ModSAF or SIMNET. Only minefields map.

j. FASCAM and Engineer minefields emplaced in BBS must be controlled by a minefield play box if they are to be replicated in the virtual environment. This reduces the number of entities required to be managed by the ModSAF and SIMNET computers.

k. Most BBS Artillery doesn't map correctly through ModSAF to SIMNET. Especially, smoke.

3. DO NOT allow the "hide" function used in Janus. It is unrealistic.

Appendix D.
Participant Comments Concerning Operational Requirements

PART 1. SIMULATIONS/SIMULATORS

Brigade Staff Comments

STOW

- The BBS and SIMNET systems don't allow for sufficient task organization down to platoon level, nor do they allow for all engineer tasks -- manual breach of a minefield, or cratering a road, for instance. ENG said the fact that the TF that was in virtual simulation affected bde staff activities: There was a technical disconnect in that the virtual TF was not able to see the lanes as they were breached, and I was unsure whether the TF was headed in the right direction . . . the lanes were not marked in the virtual world.

Simulation

- We were able to order Class III and Class V from the G4 during a deliberate attack. Unfortunately, we were not able to see the actual move of the FLE.
- It was not a seamless exercise. There were too many times when I would call the BBS cell and get answers like, 'I really can't move that unit there because I would have to create a new ICON.'
- Operators on the BBS player cells did not seem 100 percent trained. They expressed questions as to the effect or completeness of what their actions accomplished.
- The constant resetting of the game clock and forces in the simulation caused many distractions in the reporting and status process.
- On the impacts of using BBS and SIMNET as an intel gathering system: the unfamiliarity with the systems were the causes of most intelligence loss during the fight. There was a difference in opinion between the Chief of Recon and the S2. The S2 stated that BBS could not realistically provide the info necessary to conduct reconnaissance.

Reconfigurable Simulators (DRS)

- It needs improvement in the ability to dismount scouts.

PART 1. SIMULATIONS/SIMULATORS (continued)

TF 1-101 Staff Comments

STOW

- There is a difference between SIMNET NTC terrain database and BBS/Janus NTC terrain. The SIMNET 'replicates' while the BBS 'mirrors' the NTC terrain. This caused some problems in planning and executing the missions, i.e., differences in grids and terrain. Failure to see lane markers and vehicle types in DRSs. Better integration w/BBS, Janus, SIMNET, DRS, ABRAMS, M2/M3s would make the exercise that much better.
- Poor interaction between SIMNET/BBS.
- The difference between the BBS database and SIMNET database - 500 meter offset - caused problems with info exchange with the BBS cell. Should be fixed.
- The link to BBS had disadvantages: intermittent visual contact with aggregated units caused much confusion for the bn TF. We saw one thing and the Bde Cdr received other info from the BBS - minefield/obstacles are not played well in SIMNET, but very visible in BBS. Breaching cannot realistically be replicated. The instant appearance of a minefield in a cleared lane put a halt to the second DATK mission. For true integration of STOW - SIMNET to BBS - there must be a way for the SIMNET unit to see all friendly and enemy units on the battlefield. Without a good visual cue in SIMNET, the soldiers have no confidence that they can fight a fair fight.

Simulation

- Knowledge of terrain in SIMNET; takes time learning what the features would look like in SIMNET to compare with map so that fires to protect R&S plan or to help plan to bring into the plan what items I need to know to plan fires for main body so to task R&S to find that info.
- CSS was odd: 1SG/S4 called O/C on company/bn net to bring up vehicles. There really should be artillery SIMNET vehicles in place such as FISTV so that the company FSO could practice the working battle role.

Reconfigurable Simulators (DRS)

- Limited range of visibility for scouts -- used combination of BBS and DRS positions to give play more realism. From my perspective, technology did not affect this [working with brigade staff] too much -- it worked similar to other exercises.
- Lack of visibility on DRS FIST/Scouts.
- The DRS does not have 'dismount' or 'hide' position which made survivability difficult for scouts. Also, DRS must all have 'binocular' capability on all systems. The system of identifying 'breach lanes' through minefields failed. The lanes were cleared in BBS, but the SIMNET tanks were killed as they attempted to move through the marked lanes.

PART 1. SIMULATIONS/SIMULATORS (continued)

TF 1-101 Subordinate Unit (Virtual Simulation) Comments

STOW

- BBS & SIMNET are not fully integrated, in any way, shape or form.
- More disagg'd virtual forces were needed at the breach site. There normally would have been someone at the breach site to guide us through. Getting blown up while correctly driving through the breach wasn't good. The fact that we could proof the lane because we can't add mine rollers didn't help either.

Simulation

- Command and control of tactical formations is complicated by the inability of present simulation technologies to allow one to pop out of the hatch.
- Vision was limited for the TC using the vision blocks, hatch should be able to open.
- Land navigation -- I need more than an odometer which did not work/hard to see #s and terrain features to navigate.
- Depth perception, formations that look good from the TCs position are often mangled when viewed in the AAR -- pre-combat inspection (PCIs) are nonexistent.
- It is hard to do PCI and maneuver the plt with the limited vision. But after the first couple of plt runs, the platoon was able to adjust and carry out its mission.
- Graphics did not seem to have texture or identity; did not have a real view of land. Binoculars gave no indication of direction.
- Frequent breakdown of vehicles became a distracter, requiring an altering of company execution. Other than that, simulator provided opportunity to execute tasks on a battalion level which was extremely beneficial to entire company. Permitted us to see where company and its lowest level tie in with a battalion plan.
- Almost impossible to maintain navigation during fast movement.
- Lack of vision to left and right caused problems orienting and problems in attack or retrograde.
- In one exercise, we moved between the [minefield] markers. In the next, we drove over the markers and the last one, we were told to drive right of the markers.
- My simulator did not have problems, but I did have simulators that had problems in the Co. They were fixed quickly by the O/Cs and battle masters and did not really effect the training.

PART 1. SIMULATIONS/SIMULATORS (continued)

TF 1-101 Subordinate Unit (Virtual Simulation) Comments (continued)

Reconfigurable Simulators (DRS)

- From the 1SG point of view it as was good and that we were able to move with our companies, but it would be better if we could actually perform the missions at hand. I think it would be good if the DRS could be configured to replicate the following company trains vehicles: Co 1SG M113 or HMMWV, Medical M113 that could Maintenance that could repair the sims, Maintenance M88 that could tow the sims, M977 & M978s that could resupply the sims.
- Sight: graphics on HMMWV [DRS] were hard to pick up OPFOR vehicle. You had to be very close. Could not dismount, had no binocular view and driver had only front view.
- Navigation/DRS is very difficult to navigate in: terrain features, depth perception, narrow field of view. Enemy ID/poor resolution of graphics made it difficult if not impossible to ID enemy vehicles beyond 600 - 1000 meters. Not very realistic.
- Must add 180 degree viewing to DRS. Must allow computer to bring up units at less than 100% on class III and V to allow us to further expand our logpac operations. Must add azimuth indicators to DRS along with binoculars (BINOs) to add to the realism.
- Trying to put half the platoon in BBS and half in DRSs did not work. The commo wasn't that good and it was too hard to keep the two systems coordinated. Perhaps it could work if entire teams were in the same system. It worked better when we operated in BBS for the night phase and DRSs for the day phase. But you need to work hard to have more dissagregated forces for us to see when we're in the DRSs.
- Lack of peripheral vision [on DRS] causes problems in land navigation. No sights on weapons made it almost impossible to use MK-19.
- No sight for weapon; was difficult to fire.
- No problems [with simulation]; good training tool.

Brigade Workstation Team (Constructive Simulation) Comments

STOW

- Our biggest problem was synchronizing the constructive and virtual components. We were responsible for placing constructive components without knowing exactly where the virtual component was located. Trying to rectify this once play began strained our ability to support our commander's plan.
- TF 1-101 was in the SIMNET and we weren't able to track their movements in the blue room because their icons didn't appear on the screen. TF 1-101 started moving through the breach lanes and started hitting mines and wanted us to deploy the MICLICS. Well, we had the MICLICS and could have put them anywhere but couldn't because we didn't know where they were.

PART 1. SIMULATIONS/SIMULATORS (continued)

Brigade Workstation Team (Constructive Simulation) Comments (continued)

- Difficulty in seeing units of TF 101 in the second iteration was a major problem. I prefer the first iteration, where we could see every individual vehicle, than the second, where it was hard to find them - rather than overload than a scarcity of info.
- Due to problems with the simulation's ability to update SIMNET vis-à-vis BBS, we had a lot of difficulty keeping to our roles in the overall battle plan. The second iteration of the DATK was a complete wash; once we crossed the line of departure (LD), the SIMNET portion disappeared completely from our stations.
- Control was difficult because at times, the simulation technologies 'disagged' elements without warning during the exercise, adding to the burden of the role-players and interactors by distracting them from the rest of the battle.

Simulation

- The computer screwed us several times, especially at the beginning of the second iteration, by inexplicably throwing our units all over the map. The movement command function often failed to work properly.
- Computer voided information previously saved.
- Actually, the system [BBS] probably gives more quickly than you would get in real life. A few problems - the graphics on the computer map were so far off from those distributed by our brigade - a big distraction.
- The largest difficulty was in the CSS station. I don't feel there was sufficient equipment at the cell. There should have, at least, been set up like the Warfighter Exercise. At that time, we had two complete sets of CBT, CS, CSS, and monitors to run the TF. One set simply created too much confusion. It also made it difficult to consolidate reports.
- Need more terminals/screens/mice.
- Found it very difficult to get time on CSI computer. Artillery wanted the computer at the same time.

Brigade Observer (SOCT) Comments

STOW

- Technical problems to fix: 1) BBS fired FA round, disaggregate in SIMNET as 2 round. 2) Copperhead cannot be utilized (without workaround). 3) BBS will not allow M109A5/6 Howitzer ranges (i.e., 30km w/RAP), so M109A3 Howitzer had to be used. Almost all units have at least M109A5s. Causes a synchronization and planning issue. Due to my inability to coordinate with BBS or SIMNET in a timely manner, artillery effects were impossible to track by mission.
- Difficulty w/see all did not allow us to see ground truth. Unable to see the battlefield -- BBS and SIMNET do not give a 'common picture' to all players.

PART 1. SIMULATIONS/SIMULATORS (continued)

Brigade Observer (SOCT) Comments (continued)

- I could not get resolution from see all to determine proper synchronization [during execution], adequate during MDMP. Did not capitalize capabilities of BBS for feedback AAR 1 & 4. Too many workarounds.

Simulation

- There were no engineer units in SIMNET. The O/C could not see the maneuver of the engineers, their equipment status, etc. most mobility/survivability (M/S) tasks could not be executed and transferred to SIMNET. Therefore, Engineer battlefield effects were close to zero.
- Inadequacies in the simulation made it difficult to get 'game truth' to compare to data at the brigade rear.
- If the air defense equipment was on the BBS screen, it could not be seen in SIMNET; the unit in SIMNET could not tell if their air defense was effective or not.
- Current system does not interface well enough at this time to give a soldier any good/real battlefield effects. Bde Cdr could not identify unit org/bumper numbers to see where he was on the battlefield from his workstation -- system went down twice. Equipment not displayed properly to identify equip for BDA. Artillery (ARTY) impact poor.
- Being in the main TOC, [problems with observation of] battlefield effects should be transparent to the bde staff. However, with problems in simulations (e.g., breaching and movement) this was relayed to the bde staff as an artificial problem they were having.

Obtaining information

- Technical difficulties in linkage did not allow true comparisons of 'truth' versus what unit saw and reported. Could not discern enemy versus friendly indirect fire, could not see all direct fire battles, could not tell for the most part what was dead enemy or friendly (aggregated units). Difficult to get a good enough picture of the battle to discuss with bde key events, such as when they thought they had eliminated the combined arms reserve (CAR), anti-tank team (ATT), etc.
- AAR capability was very limited. Could not view direct and evaluate fire -- degraded my ability to see if it was synchronized.
- The 'see-all' station and subsequently the AAR feedback systems did not provide the resolution necessary to bring out specific points to the unit (e.g., the supporting force or breaching forces engaging enemy on the objective. Tying that into the overall bde scheme and how it supported the assault force and how it affected their mission).

Battalion Observer (Warthog) Comments

STOW

- Disaggregating BBS must be done at all levels. Friendly and enemy units were no disaggregated thus lending to confusion as to who was where and who had eyes on me.

PART 1. SIMULATIONS/SIMULATORS (continued)

Battalion Observer (Warthog) Comments (continued)

- Vehicles in BBS that were disagged caused some confusion in the ModSAF vehicles.
- An artillery round from BBS appears as an M-16 round shooting in the dirt. Not very realistic.
- As a training system, STOW was inferior to either pre-virtual or pre-constructive. Lack of disaggregation and poor function translation between systems actually hurt the unit. They did it right, the system couldn't play it. Poor observation machines and not equal to VTP playback.
- Mapping (BBS to ModSAF in SIMNET) the fires produced by BBS map on the SIMNET database as little puffs of smoke, providing no visual cues to SIMNET trainees of the effects of artillery on the battlefield. As a result, fires were replicated by the use of a ModSAF bomb button after they were identified as being fired by BBS. This seemed like a terrific waste of a station because it turned it into an overpriced noisemaker.
- BBS artillery impacts did not show up on stealth [ModSAF] and could not be observed in ModSAF vehicles. Lane markings for minefield breach should be marked on both sides of lane. Minefields, at times that were cleared and marked, had mines exploding in breach lanes causing vehicle catastrophic kills.
- The link between BBS and SIMNET was inadequate. The time delay had an adverse impact on portraying the minefield during the breach. This disrupted the synch and eventually aborted the exercise.
- M88s cannot tow anything. Bumper numbers confusing (BBS generated).
- BBS units were not disaggregated sufficiently to give the virtual bn a good picture of the battle. Units would suddenly appear on their flanks and rear, confusing them. OPFOR that was still aggregated could observe them, but the virtual bn could not observe the OPFOR.
- Lack of global visual cueing. Everything on the battlefield should be viewable by everything else. Assumes that the visual cues could be seen on the real battlefield (i.e., not masked by terrain, etc.). Total disaggregated (DISAG) is required to support this.
- Constructive and virtual area isolation. Several link limitations added to the view that the constructive and virtual components are too isolated from each other and that the limitations from one impact the effectiveness of the other. Example given is the inability for BBS to handle duplicate bumper number identifications (i.e., individual bumper numbers should be as in real world, there may be two D-6's in real life).
- Auto-DISAG function. If used, this aspect must be understood by the audience in virtual. Sudden, unexplained appearance of forces seems unrealistic. A detailed analysis of auto-DISAG timing, location, inter-visibility and results is needed before an auto-DISAG decision is made.

PART 1. SIMULATIONS/SIMULATORS (continued)

Battalion Observer (Warthog) Comments (continued)

Simulation

- Need better linkage so that training unit can see everything on the battlefield. Systems delays when a unit starts training [were a problem], a sudden stop also stops or hinders the learning.
- Minefields - this was a show-stopper during the TF DATK. Although lanes were clearly marked, vehicles were destroyed as they attempted to go through the minefield. This could not be corrected. As a result, the exercise was terminated. M88s cannot tow manned vehicles. Should be able to repeat bumper numbers.
- I was the company team trainer, and when the tanks were destroyed in the minefield, the unit questioned its ability to perform the mission.
- If the minefield/breach problem had been ID'd earlier, we could have come up with a better workaround like deleting the minefields once breached. Unit was briefed OPFOR had an anti-tank ditch as an obstacle and focused their ENG effort on AVLB which we could not portray.
- Let's try to get radar (Q-36) working in SIMNET.
- Training unit believed they were running into invisible vehicles (probably correct).
- Special munitions played in SIMNET will crash the system (Crusader). DPICM is ineffective. Smoke is ineffective. Radar is ineffective. F/ULLDS are non-existent. DRS is terrible. How about an extended view on them. At a minimum, 3500 meters.
- Visual cue accuracy/effectiveness, especially the visual effects of artillery. Need for enhanced effects to provide a recognition level to different munitions impacting.

Reconfigurable Simulators (DRS)

- We need to keep DRS as a primary trainer for our scouts. The learning curve is much higher as they know the equipment, so they are able to train and learn faster. The DRS is simple, it's real, and the soldiers have a good feel for what they are doing. DRS needs some improvement (i.e., global positioning system (GPS), azimuth [AZ] indicator, bino view for all, retical for the gun (MK19/50), retical for the bino (call for fire), need to be able to make some weapons a MK19 as this is their primary weapon destroying the BMP), I think they are going to be integrated soon. Overall, the DRS is a great training tool. We need to keep it.
- DRS cannot ID minefields. DRS can hardly see artillery impacting. DRS has no AZ indicator. DRS can only see 1000m to 1500 with bino view greatly enhanced this.
- Did not specifically observe scouts, but felt from my vantage point that they were ineffective. This may have been the result of unit shortcomings, but I also feel that the simulation plays a role in that it is extremely difficult for them to infiltrate undetected in SIMNET. Probably should look at a work-around to make this more realistic. Terrain databases do not match in DRS, SIMNET, and BBS resulting in flying vehicles or vehicles under the ground. The number of entities is way too limited so not all battlefield systems can be put on the network.

PART 1. SIMULATIONS/SIMULATORS (continued)

Battalion Observer (Warthog) Comments (continued)

- A couple of DRSs for the Plt Ldr and Plt Sgt need to be designated. The Plt Sgt is responsible for all CSS within the mortar plt (e.g., casualty evac, ammo resupply). If and when mortar platoons are used in BBS, they need to be configured according to the FMs with 6 gun tracks, 2-577s, and 2 HMMWVs. Configuration should be in two sections, 3 gun tracks and 1-577 because of split section operations which are used to keep up with information that is flowing through bn TF channels.
- A realistic scenario is unable to be planned or played if FIST sections are not used in SIMNET unless you put them in a Bradley, M1, or DRS. However, 3500 meters max sight can be used only. This is unrealistic because they should at least be able to go 10,000 meters if a good line of sight is obtained. Maybe an extended range for FISTERs is the key.
- BBS: Scouts had BBS scouts as wing men during the first test. This failed. They (BBS scouts) could not keep up. They had to travel as a BBS section, not as wing men attached to a DRS. Commo was very poor between the BBS scout and the DRS scout. During the actual STOW, we dropped BBS from the scouts and replaced them with ModSAF scouts. This worked well throughout. However, the O/C has to play the role of the wingman. This did not cause a problem as long as he used his terrain tool to locate dead space and ensure he only reported what that vehicle could see or he could use the message center.
- DRS technology. These are a valuable aspect of the STOW. They provide the 1SG, scout and FIST with a capability to exercise functional requirements. However, there are a few future requirements: 1) Visibility *improvement*. For the functional areas that use the DRS, visual depth is key. The ability to zoom-in as if with binoculars is needed or place a binocular view in a common location for all crew members. 2) Crew *functioning*. Each DRS, specifically scouts and FIST, should be capable of sustaining a three man crew. Creates more realistic functional replication.
- DRS worked great, a plus.

Obtaining information

- The STOW technology does not provide adequate observation tools (stealth, PVD view) for observing all units. Can see SIMNET or BBS, not both.
- [Using ModSAF for indirect fires] prevented the O/C FS observer from being able to use one of the computers at the station as an O/C tool for collecting AAR data because it was being used to monitor the locations of fires from BBS so ModSAF fires could be replicated on top of the location of ModSAF/SIMNET viewing.

PART 2. PHYSICAL LAYOUT

Brigade Staff Comments

- TAC layout was somewhat difficult as I couldn't put the entire CP in one track.
- Need to have separation between physical locations of TOC, Rear TOC, & TAC. Should have actual physical layouts or fabricated TOCs to permit more realistic operation of how we could function.
- Radios -- In a TOC set up radios are more segregated allowing for less distractions.

TF 1-101 Staff Comments

- Unrealistic coordination with Bde-Div-Co's. Close proximity, as with other exercises makes coordination unrealistic.
- Bde/bn/TOC/CTCP/Co interaction -- close proximity made it too tempting for most to walk between locations -- greater separation would lead to more realism.

TF 1-101 Subordinate Unit (Virtual Simulation) Comments

- BBS: could not work with the section in SIMNET building so it was difficult to coordinate.

EXCON Workstation Team Comments

- Split of EXCON in two buildings was difficult to communicate, write reports back and forth.
- The G4 node should have been co-located with the rest of the EXCON.
- The need for physical separation of the G2, G3, and Div FS in 2021 - Bay 5, and the G4 and interactor in classroom 8 - Skidgel was inconvenient but recognized as necessary. The video tele-conference (VTC)/text/whiteboard capability proved extremely useful in communicating between Bay 5 and the BBS workstation area.

Brigade Workstation Team (Constructive Simulation) Comments

- The separation geographically between the constructive and virtual sides of the game forced me to literally run back and forth to coordinate meetings with brigade.
- Information exchange was difficult due to the physical layout of the BBS system and the location of the brigade cell. The layout of the cells, while small, provided instant transfer of the needs of each other. The relative distance between cells allowed for ease in obtaining and sharing information, however, it was unrealistic to a combat situation.
- The amount of space in our cell was very inadequate, not enough space between the terminals to allow someone else to get close to the television (TV) screen or work the mouse.
- Arty workstation (CS1) is also the workstation for engineer tasks. This exercise required the extensive use of engineers at a breach that required artillery support. There were gaps in mortar support as a result.

PART 2. PHYSICAL LAYOUT (continued)

Brigade Observer (SOCT) Comments

- Physical layout (between virtual and constructive) hampered interaction and planning.

Battalion Observer (Warthog) Comments

- The use of observer/controller workstation (OCWS) 12 as EXCON station is not an ideal situation. The EXCON needs to be moved to a smaller workstation in order for the scout plt to be given their AARs or teaching a tactical solution. OCWS 12 is the only OCWS large enough to support this.
- Bn TF mortars need a separate workstation or area to operate. They have many functions within the bn and very often are the alternate TOC for the TF. DRS for Plt Sgt, Plt Cdr, and 577 area for FDC operations for battle tracking and FDC duties.
- The layout or location of the scout DRS that were placed in between the CCTT caused problems. Next time, they need to be outside of that area. Not sure, but maybe too many electrons in that area. Poor commo and DRS went down more. Bad cable layout as CCTT has wires everywhere.

PART 3. COMMUNICATION PROBLEMS

Brigade Staff Comments

- Difficult part was really not being able to know the battlefield that TF was fighting on. No BDA, poor communication radio, did not allow the staff to really know the enemy/friendly situation. If the communication was fixed, it may be a solution. Radio communication again caused problems in communicating with commander; bleed over on to other nets.
- Fragmentary orders (FRAGOs) not easily sent; commo problem. Poor commo -- lack of a dedicated Fires Net - missions of all 3 TFs were over the bde FS net; caused much confusion. Does not support a functional TAC.
- Getting current status of ADA assets was difficult/communication and technology limitations. BDA and early warning information (EWI) status passing was difficult, more so than in full FTX.
- Good exercise, but would be better if used TOE equipment specifically radios, MSE and physical layout.
- Lack of standard military communication radios, or MSE. Problems communicating between bde/bn due to not having correct radios/MSE equipment.
- Commo/citizens band (CB) radios bled over, small speaker.
- Communication network -- unable to maintain communications with BBS cell due to communications plan.
- Communication system did not allow the MSE link I usually have to coordinate with the main CP. Communications structure -- lack of normal MTOE links with Main MSE.

PART 3. COMMUNICATION PROBLEMS (continued)

Brigade Staff Comments (continued)

- Necessary copies of reports and faxing of reports: Have a copy machine ordered before the STOWEX and a facsimile (FAX) available; arrange with full-timers ahead of time and test FAX machine ahead of time.
- Commo - bn network contributed serious bleed over of signal - effective jamming. No means for delivering automated data like with initial fire support automation system (IFSAS), tactical network (TACNET), tactical facsimile (TACFAX).
- Radios -- Too many nets/sites caused commo problems i.e., bandwidth bleed and overall static on the nets.
- The communication network was inadequate for the control of the engineer piece of the battle. The resource constraint and need for a scout net bartered away the engineer in the TAC CP to get timely engineer info from the bn TF engineers directly.
- Commo - the bde command must have the best commo during the execution.
- If additional communications are available, devote them to the virtual unit

TF 1-101 Staff Comments

- The communication network is the biggest problem. With system in real world, the radio nets that could be monitored are double for the bn FAO. Info flow-in hits the crawl or miss stage real world but the number nets to pull info off is double. Find a way to automatically plug in the digital network without tasking of running wire. The digital network would feed in fast and accurately.
- Communication bleed over on frequencies/communication network.
- Communications were a problem throughout the exercise.
- Commo between TOC and simulators needs to be improved greatly.
- Commo was the main training distracter -- could not talk to the TOC the majority of the time. The lack of a TF O&I net forced too much traffic on the TF Cmd net. I only had good commo with the Bde Cdr during the 2nd iteration. The commo problem hindered the TOC from feeding me critical info and performing their function.
- The communication set up was unreliable. Specifically, 'bleed over' from one channel to the next. This made execution difficult at times.
- Cannot go down to the company frequencies to get info commo.
- Communication network - The only real problems were radios - frequencies bleeding into each other.

TF 1-101 Subordinate Unit (Virtual Simulation) Comments

- Frequencies on company and administrative/logistics operation center (ALOC) were often cluttered, but most apparent was interference and static.

PART 3. COMMUNICATION PROBLEMS (continued)

TF 1-101 Subordinate Unit (Virtual Simulation) Comments (continued)

- Problem was: Effective communication with the TOC in other building). I could hear them; they could not receive me. Source -- bad commo at the TOC? Everyone else had no problem receiving me.
- Commo network must be expanded; commo forced us to do face to face planning. Real world distance would not allow us to do that.
- Commo: too much bleed over. Made it very hard to monitor other nets during operations.
- Commo: too much bleed over -- frequencies too close. During the deliberate attack, I realized how good commo comes into play. Good rehearsals in order to accomplish the mission. We had commo problems, but in an actual M1, we had them also. But the tech staff corrected all our problems efficiently.
- Commo -- way too much bleed over as opposed to real life. Lack of SOI system. There was no real life practice of secure radio communications.
- Communication, too much bleed over on radio.
- You need more radio nets. If I'm the lead company, I would have been coordinating the passage through the breach lanes with a company from the other TF on his net. I couldn't do that this week. That also applies to coordinating with adjacent forces to our north and south as we were moving. You need to replicate these nets somehow.

EXCON Workstation Team Comments

- Initially, there was not mobile subscriber (phone) linking me with the FSB TOC/BDE S1/4. Once this communications link and fax were in place, I was able to direct and coordinate CSS planning and effective resupply between Corps/Division to FSB and other through-put locations (engineer Barrier sites).
- Radio difficulty at night was a problem. Suggest utilization of MSE phones w/less amount of CBS.
- No problems once fax and phone (MSE) link was established.
- CB radios at times had difficulties in commo, suggest utilization of MSE phones.
- Problem - plan should provide for TACFAX or commercial FAXs. One connecting role-player cells to Bde S-3 and one connecting S4-FSB to all. This was not preplanned as a requirement.
- Communications were adequate for exercise purposes except for the G4 who needed and eventually got dedicated commo with the Bde S4 and with the FSB without dropping in on their radio channels. Would like to have a way to print the messages on the white board and/or the text terminal. Several aircraft early warning messages were delayed while the engineers passed information over the ENGR/ADA net.

PART 3. COMMUNICATION PROBLEMS (continued)

EXCON Workstation Team Comments (continued)

- White board and on-line terminal connection (between EXCON in Skidgel Hall and EXCON at other building) should have an inkjet printer at each end so messages going back and forth can be printed.
- The VTC/text/whiteboard capability proved extremely useful in communicating between Bay 5 and the BBS workstation area.

Brigade Workstation Team (Constructive Simulation) Comments

- Radio communication was average at best, but it reflected the usual communication capabilities we usually have. We sacrificed that training experience and walked over to cell we were trying to talk to.
- Technical CB problems caused problems in reporting information to SIMNET/TOC/CTCP. It also caused problems in FRAGOs to BBS from TOC/CTCP.
- Primarily, the stupid *!@??*! CB radios! Our brigade commander was more angry over bad commo than anything else in this exercise, and having him angry is not a pleasant experience, even if it isn't our fault. You can't share information if you can't talk.

Brigade Observer (SOCT) Comments

- One radio net for all EN units Div-plt.
- The lack of an effective communications link between bde and bn level O/Cs also hindered the process of evaluation.
- Unable to directly communicate with OPFOR so I'd know ahead of time what he was doing.
- As an O/C, we would also need internal communication links with an O/C at the TF level to compare info flow between the bde and TF.
- Limited ability to communicate/control exercise due to non-standard O/C commo net. FA was fired at Skidgel (BBS), bn/TF were in Building 2020 (SIMNET), and I was in Building 2021 (Bay 5). I had little to no resolution on the FA battalions or TF 101.
- Lack of a central O/C net added to difficulty in setting clear picture [of vertical integration between the bde and TF].

Battalion Observer (Warthog) Comments

- More radios are needed to replicate all required nets (e.g., FS nets).
- Communication between the buildings 1724, 2021, 2020 needs to be reworked. When there were 5 scout vehicles in BBS and 5 DRSs being used, the Plt Ldr could not hear his scouts over in BBS very clearly, if at all.
- Communications need to be worked on. Hard to communicate with some elements of bn staff.

PART 3. COMMUNICATION PROBLEMS (continued)

Battalion Observer (Warthog) Comments (continued)

- Commo: The current use of 40 channel CBs to replicate commo systems is insufficient for the conduct of bde level multiechelon training. Commo problems prevented the task force from obtaining or passing important information through to the direct support FA bn. As a result, they did not get to employ a critical piece of combat power during the conduct of the exercise. A reliable, expandable commo system is needed for an exercise of this size or the unit must be prepared well in advance to supply digital equipment, providing they are trained in its use.
- The commo network did not replicate what they would have in the field. Here, the bn staff could not drop to a company frequency for direct communication, in the field, they would be able to do this.
- Radio systems over tasked, information was difficult to understand at times.
- O/Cs need one coherent O/C radio net.
- O/Cs need to be able to stay at their CP, look at charts and maps, and talk to bde & Co O/Cs at different locations to be able to disseminate and coordinate info. There needs to be a better O/C communications network in place. Someone needs to resource a multi-frequency radio/commo system that can transmit/receive between Buildings 2020, 2021, and Skidgel Hall.
- Difficult to communicate with command group O/C and to track actual picture of battle versus what was depicted in TOC.
- O/Cs need to have commo access to EXCON for situation reports (SITREPs)/intelligence summaries.
- STOW requires a dedicated link. Deals with the data and voice communications infrastructure. This link must be dedicated and expandable and must include, the audience and O/Cs. Should be hard wired, 100%.

Appendix E.
Participant Comments Concerning Training Value

Brigade Staff Comments

Comments on effect of having one TF in virtual simulation

- Seeing the battlefield was a great enhancement to knowing the fight. The link of virtual simulators gave the command a positive picture that allowed us to make good decisions. Specifically, the UAV, in conjunction with the scouts provided the dynamic flow of information that previous exercises (Dragon Fire, Cascade Peak, Mountain Summit, etc.) did not. The incorporation of UAV standard in BDA, collateral damage assessment gave us the targeting tools needed to influence the battlefield at command level.
- Provided better situational reporting from the TF in BBS. Without a TF maneuvering on the ground, SITREPs did not flow as well. BBS workstations operated in pull mode, rather than push mode from the TF to the bde. Better reporting resulted in a clear picture of the battlefield and allowed for a thorough mission analysis.
- Added realism, scouts could see the battle and report. They trained as we will fight. The 'screen' (BBS) has to be processed before a report can be sent. In SIMNET, the soldier sees more realistically what the battle will be like.

Comments on clearness of image of the battlefield

- Again, allowing one TF commander to see what was going on and to make adjustments based upon what he actually saw rather than a BBS board.
- Increased SITREPs to bde.
- Issues of maneuver were more realistic, required us to plan coordination more carefully. Maneuver in BBS is fairly straightforward.
- We could move a scout team to a location and see what was actually there.
- I feel that the TF in virtual simulation decreased the 'fog of war' due to the map board, war tracking radios, communications with lower headquarters.
- The actual friction associated with moving a TF was replicated to a greater degree. Specifically, close association and crew fatigue.
- Intel/Targeting/enemy course of action (ECOA) determination was enhanced because determination of enemy location and movement was real time and realistic. Because crews could see what and kill what we saw enhanced our capabilities to perform better.
- The TF was able to 'see' the enemy and report his disposition, as well as report obstacle information.

Comments on amount of uncertainty because of having TF in virtual simulation

- Persons in virtual simulation could see better what was going on.
- Reporting was better (pushed rather than pulled)
- Commo was better with virtual simulation TF
- Image of battlefield was more clear because of TF Cdr in virtual simulation.

Brigade Staff Comments (continued)

- Issues of maneuver are more realistic and require more planning.
- Poor commo and no BDA being provided by TF.
- Virtual simulation TF reports info better because they could see it.
- Virtual simulation TF scouts could see better.

Comments on number and quality of reports from TF in virtual simulation

- The discussion [in the Bde Rear CP] got to the point that it wasn't the fact that 101 was in virtual, but that the personnel at the 101 was better manned and was able to organize data better.
- All thought that SIMNET did not add anything to the CSS play. It wasn't better or worse. It was transparent to the Bde Rear CP.

Comments on effect of having brigade commander in virtual simulator.

- (Commander) I'm not sure, as I focused most of my attention on the TFs. Also, I never got a real feel for the battle, probably due to inexperience in the simulation. [Need] additional training for the Bde Cdr. I think that is an important piece. It needs to be worked out. Unless you go to the NTC, you fight from a map board in a CP. I had never done it [used a vehicle] until yesterday. I had a good feel for the battlefield, but it was the map. I probably should have spent some time getting a feel for the terrain and what it was. I didn't do that until we crossed the LD. Probably should have done that before the fight.
- Lines of communication were affected (negatively). Accurate picture of battlefield (positively).
- As previously stated, he could see the battlefield. The only problem I see is that some realism was lost by having his TAC staff fully functional while the command Bradley moved. We reacted to the commander's more 'perfect picture.'
- The way the TAC was configured during the exercise made no difference in our activities. We were able to reach out and touch him. In a more realistic situation, we would have had to communicate with him using another means - FM, MSE, etc.
- Specific instance: we had initiated the prep and the Bde Cdr could not see signatures of the impact. He had 'eyes on.'
- Forced more control to be placed on developing the battle and informing the Bde Cdr via tactical commo.
- Required the staff to work the BOSs together; ARTY, ENG, ADA, S-2, and report our recommendations to the commander.
- It was more realistic, however, he should have been separated from the Bde S3 and rode in separate vehicle. Communication nets may have prohibited this.

It placed a greater urgency on meeting the requirements of the deliberate decision-making process (DDMP).

Brigade Staff Comments (continued)

Comments on training benefit

- Crosstalk between TF cdrs was more than I ever recall in an exercise. FS coordination (including crosstalk) between bn FSOs was generated.
- It all comes down to the planning considerations. Coordination has to be much more realistic and detailed. BBS is fairly forgiving in what you can do. Moves an icon from a terminal is worlds away from command and controlling (C2ing) a battalion of soldiers in their vehicles.
- BBS workstations do not provide the realism. In a real situation, the commander has to rely on the information which is fed to him. He will never be able to view the entire battlefield.
- Eyes on actual situation, forced units to report in the proper format. They could and did crosstalk more because they were there.
- Bde cdr vehicle involvement created more crosstalk to staff, and also coupled with TF 1-101 generated much more crosstalk with TFs. Very effective in causing crosstalk between FSOs. More detailed information flowed about because of virtual units, especially TF cdrs, i.e., you're too close, move up, you need to move to . . . , etc.
- Battle tracking seemed to be easier since information was better and more of it because of fire supporters on the ground (virtual).
- The fact that the virtual TF was present caused more realistic considerations for the BBS units. The virtual TF could 'see' what formations were practical and this led BBS TFs to not view the world as a flat map. This caused real issues to be dealt with and BBS units to ask pertinent questions and use realism.
- Bde staff was much more terrain aware due to virtual TF as commander gave input where he could actually maneuver.
- Many more discussions on fratricide, FSCMs addressed due to virtual input.

TF 1-101 Staff Comments

Comments on quality of company reporting during plan and prep (role-played companies) versus execution (companies in virtual simulation)

- Improved performance of company personnel throughout the course of the exercise.

Comments on interaction with other (role-played) TFs

- Coordinate of passage points, breaching a minefield, etc. It increased the benefits of training. These are the same players in their position, should we go to war. Each battalion cdr got to interact with others. Needed more crosstalk between TF staffs, more radios would improve exercise.
- It increased realism by forcing us to coordinate, crosstalk, track, etc. With the other TF for passage of lines (POL), breach, fratricide avoidance. This dramatically increased the realism, however, during execution, we could not always clearly see the other TF, which made operations such as breaching, pass lines, etc., difficult and unrealistic.

TF 1-101 Staff Comments (continued)

- Was good to involve the lead meetings, but during the exercise, the communication via radio was not working. It would be possible to do battle face to face as well, but that was not possible due to the distance between the buildings.
- Coordinated the passage through the breach -- a critical task BUT! The simulation did not realistically allow guides, marking, collocation of TACs, target (TGT) list coord, etc. Good use of crosstalk with TF 69 improved my situational awareness of his friendly unit locations.
- As level of training increased -- Co/TF/Bn/Bde etc. Maneuver for our TF became more difficult to accomplish. Lent more realism to operation.
- During the DATK, we followed TF 69 up to and through the breach. We also had TF 127 do a passage from our rear to the southwest. It was very important to have the other units there to increase realism and train to prevent fratricide.

Comments on training benefit of participating in exercise with brigade staff

- (Commander) Having the bde staff/cdr as the higher HQ was very beneficial. The Bde staff was exposed to the difference between the perfect intel and info of the BBS virtual simulation. The imperfect intel and situational awareness of SIMNET. Time/distance relations are infinitely more realistic in SIMNET virtual simulation. The Bde Cdr/staff realized the effect of taking the 69th and TF 101 thru the goat trail instead of Brown Pass. The 69th in BBS was able to move much more rapidly than the 101 in SIMNET thereby opening a gap and almost failing to exploit the breach in time.
- Showed me the importance for parallel planning. If we had kept waiting for bde to plan operation would not have come off. Inadequacy of bde info at times and effect on operations as opposed to receiving canned orders illuminated need for proactive interaction with higher.
- The integration at the bde staff into the exercise increased the realism and challenge of planning and executing the mission. It allowed us to exercise the staff planning process as opposed to a perfect canned order. In BBS/JANUS type simulations, we tend to devise complicated plans which would be extremely difficult to execute. SIMNET forces us to plan simple schemes at maneuver that include planning factors we ignore when we fight a bn by manipulating icons on a screen (BBS/JANUS).
- Increased benefit as a Battalion TF, it is imperative that bn's and bde staff work together bn's need to get important info accurately on time from higher headquarters.
- When I noticed that the CSS play would be minimum (i.e. reconstituting the force automatically at the end of an iteration; same with equipment) I determined training scenarios and events that would keep my soldiers gainfully challenged. I thought bde could have done the same; they should have pressed as if we were at warfighter and require that Per STATS, 1156s and other wartime strength management functions/tasks were exercised.
- Increased realism.
- It was good to have us all work together to put a plan together in real time. At home station, it usually takes months to do the same.

TF 1-101 Staff Comments (continued)

- There was good TOC training especially with actual reports coming from the people actually fighting the battle. Missing information in the reports created the fog of war at the TOC level, especially BDA.

Comments on comparison to other simulation-based exercises

- With Janus [you have] canned exercise.
- Without simulators don't experience 'fog of war.'
- It involves all levels of unit from staff to crew member executing plan.
- Training in BBS/Janus focused more in planning than execution. SIMNET focuses more on execution. By combining the two, we increase the training benefit by adding much more detail and more planning factors, that the TF would have to consider during actual combat or NTC type training.
- Players such as scouts, tank crews, etc., were actually calling into the TOC reports as they see it while fighting the battle. Realism (much better).
- SIMNET gave battle staff real information as they would/could receive it (i.e., with human error, under stress). Where as BBS/Janus is perfect information in a controlled setting.
- It was more realistic. BBS is too exact. You get perfect grids of the enemy and exact amounts of vehicles. The fog of war really exists at the battalion.
- As stated above. BBS/Janus and SIMNET - benefits the staff working together to accomplish the mission. All of these exercises have their benefits.
- High tech, fast paced, realism.
- Interaction with bde which is usually very limited throughout the year.

TF 1-101 Subordinate Unit (Virtual Simulation) Comments

Comments on role in the exercise

- Sct Plt Ldr role in the STOWEX was bde driven.
- 1SG role was apparent; company functions and plt functions were more participating and fluid.
- Didn't affect company too much. Did add an element of realism that the battalion operations in just one piece of a bigger plan. We wouldn't be operating by ourselves but with other TFs.

Comments on training benefit

- The STOWEX did not allow the same amount of training that SIMNET allowed for bn Ops due to computer errors and the waiting on notional units. STOWEX was good to train bn and bde staffs, but for a company, the bn level SIMNET allowed more training and more AARs than STOWEX.
- Bde and battalion staffs impact my unit directly, so continue to work them.

TF 1-101 Subordinate Unit (Virtual Simulation) Comments (continued)

- Work with the rest of the unit on our missions.

- Command and control.
- STOWEX exercised reporting/planning systems more realistically.
- Interest at lowest level. Crosstrains hot seat individuals not normally armor crewmen.
- Provided a picture of the big plan, that other units outside of battalion would operate with us. However, simulation or graphical representation within the SIMNET was poor. We did not view any units that could be construed as another bn TF.
- The benefit is to be able to see the big picture and be able to understand how your section can influence the outcome.

Comments on effect on company of including brigade

- 1/3 - 2/3 was yet again thrown to the wind, therefore, intensity peaks at the co/plt level.
- It's good to have the bn and bde cdrs working together in an operational environment. Guard soldiers need to take advantage of this training opportunity.
- Just to work at brigade level.
- Command and control.
- Bn Cdr and staff had a real world higher HQ to answer to. This intensified the orders process and the reporting process. There are very few opportunities to exercise command and control systems between bn/bde, so the bde's presence in this exercise was worthwhile.
- Working with various unit completing the same mission.
- Displayed troubles found in execution of a bde plan. Frequent FRAGOs.

TF 1-101 Subordinate Unit Members Comments

Comments on features of the STOW exercise that made it more intense and realistic than other exercises

- The road march -- it was as if we were really on a road march.
- Anticipation of enemy contact.
- There were more factor of time, and other element that I'm not used to. I normally train mostly company level, and there is less waiting involved.
- Happy to have had the opportunity to participate and see just how devastating a TF could be in the eyes of the enemy forces.
- Enhanced road march boredom -- more realistic, less intense.
- Many more vehicles, a better prepared enemy, realistic approach to the mission.
- The sheer scope of the exercise was very exciting to see the amount of vehicles involved and what it takes to execute such an operation was in a word, 'emotional.'

TF 1-101 Subordinate Unit Members Comments (continued)

- The entire brigade involvement in itself made this more realistic.

- Slower pace, it seemed that we were always stopping to let the rest of the brigade catch up. So the crew got bored, but that would be realistic.
- The troops knew the importance of the bde exercise and took the training very seriously and professionally.
- Because I never did it before, it was very good training.
- To see and coordinate for sister elements maneuvering around the battlefield.
- Road march from hell.
- The boredom of waiting while the brigade got underway. The awesome operation and teamwork that went into destroying the enemy.
- It was like being in a real battle.
- Larger moving force.

Comments indicating the best and worst things about the STOW-ET:

(D = Driver; G = Gunner; L = Loader; T = TC)

Best Things:

- (D) Maneuvering a platoon within a brigade formation.
- (D) Close to life.
- (D) United cross-level training with other.
- (G) Commo and chain of command.
- (G) Actually being able to participate in an exercise of this level.
- (G) The ability to be part of a force that I may never have seen assembled outside the virtual world.
- (G) The introduction to a large scale engagement.
- (G) Seeing how all the companies and brigades work together to en mass force on the enemy.
- (G) Chance to observe battlefield confusion that can crop up - developed ideas about how to avoid them when I'm in leadership position.
- (G) The scope and power of the exercise was exciting in its own right, also you gain a confidence in your organization seeing that you can all work together in combat, keeping each other alive. With that you can concentrate on your job, not your ass.
- (L) Bringing all of our units together and learning how to work as a better team.
- (TC) Understanding and seeing how large the brigade really is. Huge! It's amazing to watch it work.

TF 1-101 Subordinate Unit Members Comments (continued)

- (TC) Chance to train the brigade in a STOW environment and to maneuver with sister units.

- (TC) Seeing how other companies and other battalions fall into the big picture.
- (TC) To be able to see how the battlefield works on all levels.
- (TC) Joint operation of units was needed (vital).

Worst Things:

- (D) Computer glitches.
- (D) All the waiting.
- (D) Sitting and waiting. Nothing to do. Too much idle time.
- (D) We were told that we were being attacked, but did not see any enemy because the computer messed up.
- (L) Not enough enemy contact.
- (L) The computer glitches in the graphics made it extremely hard to define certain targets; especially with the graphics popping in and out.
- (L) We accomplished nothing.
- (TC) Out of control vehicles.
- (TC) Commo -- the different nets were bleeding over making it almost impossible to decipher what was important.
- (TC) The road march, the boredom, the glitches and breakdowns.
- (TC) Boring.

EXCON Workstation Team Comments

Comments on potential benefits of a STOW-type exercise

- Very cost effective, enable the bde to implement an OPORD through the decision-making process (DMP) down to lower echelon and see the maneuver/TFs execute on the PVD was beneficial to all levels.
- Excellent. The walkthrough of the MDMP greatly improved the maneuver bde's appreciation of fully integrating ALL FS assets and helped the brigade to realistically employ FS to maximize the bde's combat power.
- This is the very best I have seen to date. It is an example of training at a cost effective level.
- STOW Enhancement: As the bde's higher HQ, EXCON did not notice any difference between the virtual TF and constructive.
- Using their warfighter exercises as a frame of reference, they extolled the value of this training for the bde staff with a focus on process/development as opposed to the warfighter focus on evaluation and stressing the staff. The COBRAS program appealed to the group. They wanted to know when materials would be available and remarked it is just what the guard needs.

EXCON Workstation Team Comments (continued)

- Able to follow the battle from higher to lower level echelon.
- Excellent. The use of simulation and real time factors prevented some of the 'Command Post Exercise (CPX) magic' that often occurs in non-sim environment.
- Having the ability to see the entire battlefield assists in decisions in a timely manner.

Brigade Observer (SOCT) Comments

Comments on potential benefits of a STOW-type exercise

- Really can't address DRS as I did not have one at my station (main TOC). Any opportunity for a bde or TF staff to undergo a simulation experience is a plus and so was STOWEX.
- Concept and idea is great, but workarounds/deficiencies cause major distracters. Simulation will never be perfect, but software/hardware need vast improvement to make training experience more realistic and simulation invisible to unit.
- Mixed. Good idea, but did not work as well as a single, stand-alone media. 3 BCT, 1 Armor Division (Fort Riley) Nov 97 rotation was much easier, less complex, and the bottom line is the unit was better trained.
- This is a good program that can be of value to units that do not have the time or money to go to the field. There are things that need to be addressed on how the two systems will link up so that everyone had the same picture.
- I think that the possibilities to increase the overall training value for the unit with STOW is great however the link is not there yet.
- This is undoubtedly the way to go, if the system is constructed to perform as we all want it to.
- Multi-echelon training is good, but this linkage is not ready for prime-time training.
- There is a need for program like this if we can make it properly interface -- we are not there yet.
- When perfected, STOW provides units a low cost, real time multi-echelon training down to individual crew member. However, if the focal point of the exercise is on the brigade or battalion staff, a single simulation model (BBS, Janus) provides an equally effective multi-echelon training platform down to company commander.
- Engineers only conducted BBS operations and what Engineers task they could have done in BBS would not map into SIMNET. Therefore, STOW is a good idea but the technology would not support Engineer operation. The M/S BOS data that could be manually transferred between the system was not transparent to the unit.

Battalion Observer (Warthogs) Comments

Value at Company/Team Level

- At the Co/Tm level, the STOW exercise had minimal impact. The training was conducted in the same manner as during any VTP rotation. The value to the Co/teams (TMs) was limited. They basically executed a standard VTP mission with the impact of other units from BBS limited to a unit to follow.
- I'm not convinced that STOW can or will add any training value to exercises at any level, even if a perfect system is developed. Relatively high, but not necessarily as a result of 'STOW'. SIMNET alone with the company's higher HQ would be more effective at this level.
- I believe the bulk of learning was at this level. While the TF and brigade planned, the companies/teams higher HQ would be more effective at this level.
- Excellent: if the tiered approach to multi-echelon training is in effect. Company training prior to bn/bde level exercise.
- Do I feel the STOW is a good idea? Yes. I just feel the software and hardware needs a lot of work.
- [The training value was] high - up to bn level.
- Minimal - VTP exercises are better training for CCS than this exercise. STOW didn't work and too much sitting around at co level.
- Limited because of the time involved with bde planning and maneuver. Time spent better at Co lanes or VTP.
- Virtual company/team training is very beneficial. Constructive training did not do much for them.

Value for Scout Platoon

- The scouts had a great training environment. STOW allowed them to be integrated at the TF level. S2 & S3 bn Cmd hardly ever deal with planning or execution of bn scouts; with DRS and STOW we can better prepare our scouts for combat.
- The training value to the scout plt was good. It did have problems that the scouts did work through. The main point the STOWEX helped them realize was the need for the PL & PSG to work more closely with the bn staff and make the bn staff work for them in order to achieve their mission. The bn staff hopefully realized that they need to plan support for the scouts more closely. The scout plt had to use its own initiative in order to stay in the battle. The bn staff set them on a screen for a security force and left them there after the unit passed their locations. The PL moved his plt on his own in order to gain intelligence during the mission. This made the PL realize that the scout plt cannot wait for orders from higher to complete its mission. He had to use initiative to move his plt and keep the bn informed of his intentions and locations.
- DRS played an important part in the training and are easy to learn.

Battalion Observer (Warthogs) Comments (continued)

- Did not observe directly, however, the value of the scouts to the TOC increased dramatically with each iteration. The scout platoon gave better and more information with each mission.
- [The value to the scout platoon was] high - up to bn level.
- Excellent because of DRS. We need 10 HMMWV - Bradley no good. Good scout mission.
- DRS is limiting factor because of limited distance scouts/FSO can see.
- Again, virtual training was beneficial. With the exception of the limitations of the DRS. Constructive training, no benefit.

Value for Support Platoon Leader

- There was no training value for the Support Platoon Leader.
- Pretty decent training in CSS overall due to DRS (1SGT) and planning within a brigade operation.
- Very limited.
- None - he augmented the CTCP during this exercise.
- There was no viable role for support platoon leader. He did not have a DRS. He would ordinarily remain in the BSA until the logistics package (LOGPAC) was pushed forward anyway and this only happened once during the entire week.

Appendix F.
Training Value Questions

Battle Damage Assessment (BDA)

- Was BDA reported and was it accurate?
- Were BDA reports from virtual units utilized?
- Did the brigade staff request BDA from virtual units?
- Was BDA included more often in reports from virtual units than from constructive units?
- Did the capability to assess actual enemy losses give a clearer picture to brigade commander and staff (S2/S3/FSO)?

Indirect Fire Support

- How many virtual fire missions were observed fire missions?
- Were virtual fire missions adjusted and repeated for maximum effect (i.e., were virtual fire missions more effective)?
- Did brigade FSE/S3/Commander give higher priority to missions that could be observed?
- Did the commander and staff utilize indirect fire and air support better because it was observed and could be actually integrated with the maneuver plan on a real time basis?
- Was there less indirect fire fratricide in virtual units than in constructive units?
- Were fires cleared down to company level?

Commander's Reconnaissance

- How many reconnaissance did the commander and staff conduct? Who was involved?
- How were the reconnaissance reflected in the planning process? What specific things were directed by the commander based on his actual reconnaissance?

Command and Control

- How much time did the commander spend in his "vehicle" (and at what points) during the mission?
- Where did the commander position himself on the ground?
- How did the commander being "on the ground" affect the conduct of the execution?

Full Dress Rehearsals

- Did the brigade do any full dress rehearsals?
- If yes, who was involved? Were TF and brigade TOCs functional during the rehearsal?
- If used, did the full rehearsal substitute for other rehearsals?

Battle Monitoring

- Was this technique ever used in the brigade TOC?
- If yes, what was the effect?

Reconnaissance Tracking

- Did the virtual TF report more actual information and confirm or deny more PIR than the constructive TFs?
- Were there reports submitted and adjustments made to the reconnaissance plan in virtual TF because scouts could not carry out their mission?
- Were the PIR in the virtual TF more actively and accurately tracked at brigade than the PIR assigned to the constructive TF?

Land Management

- What land management conflicts were identified to brigade? Who were the conflicts between and when?
- Were there any fratricides caused by land management conflicts?
- What active land management steps were taken by brigade based on input from virtual units? Were any raised by constructive units?